

**EPA Superfund  
Record of Decision:**

**NYANZA CHEMICAL WASTE DUMP  
EPA ID: MAD990685422  
OU 02  
ASHLAND, MA  
09/23/1991**

Text:

1) EXTRACTING CONTAMINATED GROUNDWATER FROM THE NORTHERN PORTION OF THE SITE NEAR THE RAILROAD TRACKS AND INDUSTRIAL PARK, AND OPTIONALLY AT THE SOUTHERN BORDER OF THE CAP NOW UNDER CONSTRUCTION ON MEGUNKO HILL FOR A MINIMUM OF 5 YEARS; 2) TREATING THE GROUNDWATER WITH A COMBINATION OF PHYSICAL AND CHEMICAL PROCESSES; 3) DISCHARGING THE TREATED WATER INTO THE SUDBURY RIVER; 4) USING INSTITUTIONAL AND ACCESS CONTROLS TO LIMIT EXPOSURE TO CONTAMINANTS; 5) PERFORMING PUMP TESTS IN THE EASTERN PORTION OF THE PLUME TO HELP DETERMINE THE FEASIBILITY OF CLEANING UP GROUNDWATER IN THIS AREA AT SOME FUTURE POINT; 6) INSTALLING ADDITIONAL DEEP BEDROCK WELLS TO MORE FULLY DEFINE THE DEPTHS AND LOCATIONS TO WHICH CONTAMINANTS MAY HAVE MIGRATED; 7) PERFORMING CONTINUING MONITORING OF SELECTED EXISTING RESIDENTIAL AND MONITORING WELLS AND LIMITED SURFACE WATER TESTING TO TRACK ANY FURTHER PROGRESS OF THE PLUME; 8) INSPECTING THE MEGUNKO ROAD WATER LINE; AND 9) PERFORMING CERTAIN PRE-DESIGN STUDIES TO AID IN THE DESIGN OF THE SELECTED REMEDY. THE FIRST OPERABLE UNIT ADDRESSED CONTAMINATED SLUDGES AND SOILS BY EXCAVATING THEM FROM OUTLYING AREAS, AND CONSOLIDATING THEM WITH SLUDGES ALREADY ON MEGUNKO HILL UNDER AN IMPERMEABLE CAP. THE FIRST OPERABLE UNIT ROD ALSO INCLUDED AN UPGRADIENT DIVERSION TRENCH TO PRECLUDE CONTACT WITH GROUNDWATER AND SURFACE WATER RUNOFF WITH THE BURIED MATERIAL. CONSTRUCTION OF THE FIRST OPERABLE UNIT REMEDY IS EXPECTED TO BE COMPLETED IN LATE 1991.

THIS SECOND OPERABLE UNIT INTERIM REMEDIAL ACTION WILL SERVE TO COLLECT DATA TO REFINE THE CLEANUP TIME ESTIMATES FOR THE FINAL RECORD OF DECISION, AND WILL IN THE INTERIM ADDRESS THE FOLLOWING PRINCIPAL THREATS TO HUMAN HEALTH AND THE ENVIRONMENT POSED BY THE SITE: MIGRATION OF CONTAMINANTS IN GROUNDWATER, RISKS TO HUMAN HEALTH ASSOCIATED WITH POTENTIAL FUTURE CONSUMPTION AND DIRECT CONTACT WITH GROUNDWATER, RISKS FROM PRESENT AND POTENTIAL FUTURE INHALATION OF EVAPORATED GROUNDWATER CONTAMINANTS, AND DEGRADATION OF THE SUDBURY RIVER AND WETLANDS DUE TO THE NATURAL DISCHARGE OF CONTAMINATED GROUNDWATER.

THE THIRD OPERABLE UNIT CONCERNS THE IMPACT OF NYANZA'S PAST UNCONTROLLED WASTEWATER DISCHARGES TO THE SUDBURY RIVER AND ITS TRIBUTARIES. A ROD FOR THAT OPERABLE UNIT IS SCHEDULED FOR NEXT YEAR.

DECLARATION

THE SELECTED REMEDY IS PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT, ATTAINS FEDERAL AND STATE REQUIREMENTS THAT ARE APPLICABLE FOR THIS REMEDIAL ACTION AND IS COST-EFFECTIVE. THE SELECTED REMEDY UTILIZES PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE. THE STATUTORY PREFERENCE FOR REMEDIES THAT UTILIZE TREATMENT AS A PRINCIPAL ELEMENT TO REDUCE THE MOBILITY, TOXICITY, OR VOLUME OF HAZARDOUS SUBSTANCES IS MET BY THE SELECTED REMEDY.

09/23/91

JULIE BELAGA  
REGIONAL ADMINISTRATOR  
EPA REGION I

#SNLD

## I. SITE NAME, LOCATION AND DESCRIPTION

THE NYANZA CHEMICAL WASTE DUMP SUPERFUND SITE - GROUNDWATER STUDY AREA IS LOCATED IN THE TOWN OF ASHLAND, MIDDLESEX COUNTY, MASSACHUSETTS (SEE FIGURE 1-1). ASHLAND IS LOCATED IN THE METROWEST AREA OF EASTERN MASSACHUSETTS, BORDERED BY SHERBORN TO THE EAST, SOUTHBOROUGH TO THE WEST AND NORTHWEST, FRAMINGHAM TO THE NORTH, AND HOPKINTON AND HOLLISTON TO THE SOUTH. ASHLAND IS 25 MILES WEST-SOUTHWEST OF BOSTON, AND 20 MILES EAST-SOUTHEAST OF WORCESTER.

THE "SITE", FOR PURPOSES OF DESCRIBING THE OPERABLE UNIT II

- GROUNDWATER STUDY, CONSISTS OF ALL AREAS IN AND ADJACENT TO THE NYANZA PROPERTY WHICH APPEAR TO BE SOURCES OF GROUNDWATER CONTAMINATION \*(1).

THE "NYANZA PROPERTY", WHICH IS A PART OF THE SITE, CONSISTS OF APPROXIMATELY 35 ACRES FORMERLY OWNED BY NYANZA, INC. (FIGURE 1-2) AND INCLUDES SEVERAL WETLANDS, THE MEGUNKO HILL AREA, AND THE LOWER INDUSTRIAL AREA ALONG MEGUNKO ROAD. THE HILL IS LOCATED IN THE SOUTHERN PART OF THE PROPERTY AND WAS FORMERLY USED AS A LANDFILL/DISPOSAL AREA. THIS AREA IS CURRENTLY THE FOCUS OF OPERABLE UNIT I REMEDIATION ACTIVITIES. THE LOWER INDUSTRIAL AREA WAS FORMERLY THE LOCATION OF DYE MANUFACTURING FACILITIES, THE WASTEWATER TREATMENT SYSTEM AND A SERIES OF SETTLING LAGOONS SOUTH OF MEGUNKO ROAD. THE AREAL EXTENT OF THE SITE IS APPROXIMATELY BOUNDED BY AN ACTIVE CONRAIL RAILROAD LINE AND CHEMICAL BROOK TO THE NORTH, WETLAND AREAS AND CHERRY STREET TO THE EAST, AND UNDEVELOPED MIXED HARDWOOD FOREST LAND TO THE SOUTH, SOUTHEAST, AND WEST. THE SUDBURY RIVER IS APPROXIMATELY 700 FEET NORTH OF THE SITE.

THE "STUDY AREA" OF THE OPERABLE UNIT II - GROUNDWATER STUDY IS LARGER THAN THE SITE. IT CONSISTS OF THE SITE PLUS THE AREAL EXTENT OF WELLS (APPROXIMATELY 395 ACRES) INSTALLED OFF THE NYANZA PROPERTY THUS FAR.

THIS REPORT ALSO DISCUSSES THE DOWNGRAIENT AREA, WHICH IS THE AREA NORTH AND EAST OF THE SITE BOUNDED BY THE SUDBURY RIVER. GROUNDWATER CONTAMINATION AS A RESULT OF CONTAMINANT MIGRATION FROM THE NYANZA SITE HAS BEEN DOCUMENTED IN THIS AREA.

THE TOWN OF ASHLAND OCCUPIES APPROXIMATELY 12.9 SQUARE MILES, OF WHICH 18 PERCENT IS OPEN WATER AND WETLAND AREAS, AND MORE THAN 40 PERCENT IS INTENSIVELY DEVELOPED. THE BULK OF DEVELOPMENT HAS OCCURRED IN RESPONSE TO THE NEED FOR SINGLE- AND MULTIPLE-FAMILY HOUSING CREATED BY RAPID ECONOMIC EXPANSION ALONG THE MAJOR TRANSPORTATION ROUTES: STATE ROUTE

(1) FOR PURPOSES OF CERCLA S 121(E) (1) IN SO FAR AS IT RELATES TO PERMITS, "ON-SITE" SHALL BE "THE AREAL EXTENT OF CONTAMINATION AND ALL SUITABLE AREAS IN VERY CLOSE PROXIMITY TO THE CONTAMINATION NECESSARY FOR IMPLEMENTATION OF THE RESPONSE ACTIONS". NATIONAL OIL AND HAZARDOUS SUBSTANCES POLLUTION CONTINGENCY PLAN (NCP), 40 CFR S 300.400(E).

128 (I-95), I-495, US ROUTE 9, AND I-290. FROM 1951 TO 1980, AGRICULTURE AND OPENLAND USE IN THE AREA HAS DECREASED FROM 19 TO LESS THAN FIVE PERCENT.

THE SITE IS CLASSIFIED AS INDUSTRIAL, WETLAND, AND FOREST (US DEPARTMENT OF FORESTRY AND WILDLIFE MANAGEMENT, 1982). SOUTH AND SOUTHEAST OF THE SITE, THE UPPER ELEVATIONS OF MEGUNKO HILL ARE FORESTED WITH STANDS OF MIXED HARDWOODS ON WELL-DRAINED, STONY SOILS. THE LOWER INDUSTRIAL AREA OF THE SITE, BUILT ON UDORTHENT SOILS (FILLED OR HUMAN-INFLUENCED LAND), SUPPORTS SEVERAL LIGHT INDUSTRIES AND COMMERCIAL BUSINESSES AND LITTLE TO NO VEGETATION.

THE LAND NORTH, NORTHEAST, AND EAST OF THE SITE IS CLASSIFIED AS URBAN-SUBURBAN (US DEPARTMENT OF FORESTRY AND WILDLIFE MANAGEMENT, 1982). IT RECEIVES HEAVY USE AND INCLUDES RESIDENTIAL, COMMERCIAL, INDUSTRIAL, AND PUBLIC RECREATION AREAS. THE CENTER OF ASHLAND VILLAGE IS LOCATED LESS THAN ONE-HALF MILE NORTHEAST OF NYANZA. STONE PARK (THE TOWN PARK) IS LOCATED 1700 FEET SOUTHEAST OF THE SITE AND IS HEAVILY USED DURING THE SUMMER MONTHS. ASHLAND JUNIOR HIGH SCHOOL IS LOCATED JUST OVER THREE QUARTERS OF A MILE NORTHWEST OF THE SITE. MUCH OF THE WOODLANDS NORTH OF THE SUDBURY RIVER HAVE BEEN RECENTLY CLEARED FOR RESIDENTIAL CONSTRUCTION.

#SHEA

## II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

### A. LAND USE AND RESPONSE HISTORY

FROM 1917 THROUGH 1978, THE PROPERTY WAS OCCUPIED BY SEVERAL COMPANIES INVOLVED IN MANUFACTURING OF SEVERAL PRODUCTS. TEXTILE DYES AND DYE INTERMEDIATES WERE PRODUCED ON THE SITE UNTIL 1978 WHEN NYANZA, INC. APPARENTLY CEASED OPERATIONS. PRODUCTS MANUFACTURED ON THE PROPERTY IN ADDITION TO THOSE PREVIOUSLY MENTIONED INCLUDED INORGANIC COLLOIDAL SOLIDS AND ACRYLIC POLYMERS. STARTING IN 1917, SEVERAL TYPES OF CHEMICAL WASTES WERE DISPOSED IN VARIOUS ON-SITE LOCATIONS WITH THE MAJORITY OF THESE WASTES DEPOSITED ON MEGUNKO HILL, WHICH WAS USED AS AN UNSECURED LANDFILL. WASTES INCLUDED PARTIALLY-TREATED PROCESS WASTEWATER; CHEMICAL SLUDGE FROM THE WASTEWATER TREATMENT PROCESS; SOLID AND FILTER CAKES) IN DRUMS; SOLVENT RECOVERY DISTILLATION RESIDUE IN DRUMS; AND OFF-SPECIFICATION PRODUCTS. PROCESS CHEMICALS THAT COULD NOT BE RECYCLED OR REUSED (INCLUDING PHENOL, NITROBENZENE, AND MERCURIC SULFATE) WERE ALSO DISPOSED OF ON-SITE.

CHEMICAL WASTES WERE ALSO DISPOSED OF IN THE WETLAND AREAS. THE EASTERN WETLAND AREA RECEIVED WASTE EFFLUENT DISCHARGE FROM VARIOUS MANUFACTURING OPERATIONS IN THE AREA. THE NORTHWEST WETLAND AREA AT THE HEADWATER OF CHEMICAL BROOK CONTAINED WASTEWATER TREATMENT SLUDGE AND POSSIBLY RECEIVED OVERFLOW FROM AN UNDERGROUND CONCRETE WASTEWATER VAULT THAT DISCHARGED INTO CHEMICAL BROOK.

NYANZA, INC., WHICH APPARENTLY CEASED OPERATIONS IN ASHLAND IN 1978, WAS THE MOST RECENT DYE MANUFACTURING COMPANY TO OCCUPY THE SITE. THE FORMER PLANT GROUNDS NOW ARE OCCUPIED BY SEVERAL INDUSTRIAL CONCERNS, THE LARGEST OF WHICH IS NYACOL PRODUCTS, INC.

NYANZA, INC. AND ITS PREDECESSORS ORIGINALLY DISCHARGED THE DYE WASTE STREAM TO A CONCRETE "VAULT" OR SETTLING BASIN ADJACENT TO THE MAIN PROCESS BUILDING. THE VAULT WAS USED AS A CENTRAL SUMP FOR THE COLLECTION OF WASTEWATER FROM THE ENTIRE NYANZA, INC. OPERATION, AS WELL AS FOR OTHER GENERATING TENANTS HOUSED IN THE IMMEDIATE VICINITY. THIS VAULT WAS APPROXIMATELY 40 X 80 FEET AND APPROXIMATELY 10 FEET DEEP. THE LIQUID OCCASIONALLY OVERFLOWED VIA A PIPE INTO CHEMICAL BROOK WHICH FLOWED INTO TROLLEY BROOK AND THROUGH A CULVERT TO THE RACEWAY THAT ENTERED THE WETLANDS ALONG THE SUDBURY RIVER. THE VAULT WAS TAKEN OUT OF SERVICE IN THE 1960'S OR 1970'S AND WAS SUBSEQUENTLY FILLED WITH SLUDGE AND COVERED OVER WITH FILL. AS PART OF AN ONGOING EFFORT TO EASE RIVER POLLUTION, THE MASSACHUSETTS DIVISION OF WATER POLLUTION CONTROL (DWPC) ORDERED NYANZA, INC. TO INSTALL A PRETREATMENT SYSTEM FOR INDUSTRIAL PROCESS WATER AND TO DISCHARGE THE TREATED WASTE TO THE METROPOLITAN DISTRICT COMMISSION (MDC) SEWER COLLECTION SYSTEM. NYANZA, INC. CONNECTED TO THE MDC SYSTEM IN MARCH 1970.

THE FIRST TYPE OF CONTAMINATION LINKED TO THE SITE WAS MERCURY, DISCOVERED IN THE SUDBURY RIVER IN 1970, AS PART OF AN OVERALL INVESTIGATION OF MERCURY PROBLEMS IN MASSACHUSETTS FOR THE DWPC. A FOLLOW UP STUDY IN 1972 FOCUSING ON NYANZA, INC. REVEALED MERCURY CONTAMINATION IN THE SUDBURY RIVER CAUSED BY UNCONTROLLED SLUDGE AND WASTEWATER DISPOSAL AT THE SITE.

SINCE 1972, SEVERAL INVESTIGATIONS HAVE BEEN PROMPTED BY CONTAMINATION PRESENT AT OR ORIGINATING FROM THE SITE. FROM 1972 THROUGH 1977, THE MASSACHUSETTS DEPARTMENT OF WATER POLLUTION CONTROL (DWPC) AND DEPARTMENT OF PUBLIC HEALTH (DPH) CITED NYANZA, INC., FOR SEVERAL CONTAMINATION PROBLEMS ASSOCIATED WITH DUMPING ACTIVITIES. FOLLOWING A 1973 DWPC ORDER TO IMPLEMENT A PLAN TO STOP FURTHER GROUNDWATER POLLUTION, CAMP DRESSER AND MCKEE, INC. (CDM), WORKING FOR NYANZA, INC., PERFORMED A 1974 SITE INVESTIGATION AIMED AT SOURCE IDENTIFICATION AND DEvised PLANS TO CONTROL GROUNDWATER CONTAMINATION ON THE NYANZA PROPERTY; HOWEVER, THE PLANS WERE NOT IMPLEMENTED. IN 1979, EDWARD J. CAMILLE, A PROPERTY OWNER, HIRED CONNORSTONE ENGINEERING, INC. TO COMPLETE THE CDM GROUNDWATER POLLUTION CONTROL PROGRAM. HOWEVER, THE MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL QUALITY ENGINEERING (DEQE; NOW KNOWN AS THE DEPARTMENT OF ENVIRONMENTAL PROTECTION OR DEP) HALTED THESE PLANS, PENDING FURTHER INVESTIGATION. IN 1980, DEQE RELEASED A PRELIMINARY SITE ASSESSMENT REPORT SUMMARIZING THE SITE HISTORY AND FINDINGS OF PREVIOUS INVESTIGATIONS AT THE SITE (DEQE, 1980). MCL DEVELOPMENT CORPORATION ACQUIRED MUCH OF THE PROPERTY IN 1981, AND HIRED CONNORSTONE ENGINEERING, INC. AND CARR RESEARCH LABORATORY, INC. TO CHARACTERIZE SOIL COMPOSITION AND LOCATE SLUDGE DEPOSITS.

THE SITE WAS INCLUDED ON THE ORIGINAL NATIONAL PRIORITY LIST (NPL) OF SUPERFUND SITES IN 1982 AND A PRELIMINARY REMEDIAL ACTION MASTER PLAN (RAMP) WAS PREPARED. IN 1984, THE ENVIRONMENTAL PROTECTION AGENCY (EPA) AUTHORIZED NUS CORPORATION (NUS) TO PERFORM AN REMEDIAL INVESTIGATION/FEASIBILITY STUDY.

THE SEPTEMBER 4, 1985 RECORD OF DECISION (ROD) DIVIDED THE AGENCY'S REMEDIAL RESPONSE INTO OPERABLE UNITS FOR THE PURPOSE OF ADDRESSING DISTINCT PROBLEMS. THE SEPTEMBER 1985 ROD WAS DESIGNATED OPERABLE UNIT I. THE ROD SELECTED SOIL AND WETLAND EXCAVATION AT NINE LOCALIZED AREAS OF CONTAMINATION; SOLIDIFICATION OF WATER BEARING EXCAVATED SLUDGE, SEDIMENTS, AND SOIL; AND PLACEMENT, CAPPING AND CONSOLIDATION OF THOSE MATERIALS WITH MATERIAL LEFT IN PLACE ON THE "HILL" AREA IN THE SOUTHERN PART OF THE SITE. A DIVERSION TRENCH HAS BEEN CONSTRUCTED ON THE SIDE OF MEGUNKO HILL ABOVE AND AROUND THE CAPPED AREA TO DIVERT SURFACE WATER FLOW AND LOWER THE GROUNDWATER TABLE BENEATH THE CAP AS PART OF OPERABLE UNIT I. CONSTRUCTION OF THE PROJECT BEGAN IN EARLY 1989 AND WILL BE COMPLETE IN LATE 1991.

IN 1985 THE DEQE UNDERTOOK AN INTERIM RESPONSE MEASURE AT THE SITE CONSISTING OF THE FOLLOWING ACTIVITIES: FENCING THE TROLLEY BROOK ROAD EMBANKMENT; PLACING ONE FOOT OF CLEAN FILL IN ONE OF THE SITE AREAS TO REMOVE THE THREAT OF DIRECT CONTACT; AND CULVERTING CHEMICAL BROOK THROUGH NEIGHBORING PROPERTY.

IN 1986, EPA AUTHORIZED CDM TO CONDUCT ADDITIONAL FIELD INVESTIGATIONS TO DEFINE SOURCE LOCATIONS AND DESIGN THE REMEDIAL ACTION STIPULATED IN THE ROD. THE REMEDIAL DESIGN IS COMPLETE AND CONSTRUCTION BEGAN IN EARLY 1989.

IN JANUARY 1987, DEQE AND THE EPA ENVIRONMENTAL SERVICES DIVISION (ESD) INITIATED A SLUDGE REMOVAL ACTION OF THE CONTENTS WITHIN THE VAULT (SEE FIGURE 2-2). PRIOR STUDIES BY A DEQE CONTRACTOR INDICATED THAT THE VAULT, AND CONTAMINATED SOIL AND GROUNDWATER IN THE VICINITY OF THE VAULT, WERE A SIGNIFICANT SOURCE OF ORGANIC CONTAMINATION IN THE GROUNDWATER DOWNGRADE OF THE AREA. CONTAMINANTS PRESENT INCLUDED, BUT WERE NOT LIMITED TO, TRICHLOROETHENE (TCE), CHLOROBENZENE, AND NITROBENZENE, ALL BY-PRODUCTS OF ANILINE DYE PRODUCTION. INORGANIC CONTAMINANTS FOUND IN THE SLUDGE INCLUDED HEAVY METALS SUCH AS ANTIMONY, CADMIUM AND CHROMIUM. INITIALLY, THE VAULT CONTAMINATION INVESTIGATION WAS PLANNED WITHIN THE SCOPE OF OPERABLE UNIT II. DEQE AND THE EPA CONDUCTED A SUBSURFACE INVESTIGATION IN THE VAULT AND SURROUNDING AREA, CULMINATING IN A DECISION TO PROCEED IMMEDIATELY WITH REMEDIATION OF THE VAULT AREA. THE REMOVAL ACTION WAS CONDUCTED BY EPA'S EMERGENCY RESPONSE TEAM. FROM OCTOBER TO DECEMBER 1987, 665 TONS OF SOIL ADJACENT TO THE VAULT WERE REMOVED; 309 TONS WERE INCINERATED, AND 356 TONS WERE SHIPPED OFF-SITE TO AN APPROVED LANDFILL. IN MARCH AND JUNE 1988, 2,512 TONS OF SLUDGE FROM THE VAULT WAS SOLIDIFIED ON-SITE AND DISPOSED OF AT AN OFF-SITE RCRA LANDFILL FACILITY.

IN JUNE 1987, EPA AUTHORIZED THE REM III TEAM TO BEGIN RI/FS ACTIVITIES FOR OPERABLE UNIT II. OPERABLE UNIT II COMPRISES GROUNDWATER CONTAMINATION RELATED TO THE SITE. A THIRD SET OF RI/FS INVESTIGATIONS, OPERABLE UNIT III, IS FOCUSED ON CONTAMINATION IN THE SUDBURY RIVER. WORK ON OPERABLE UNIT III IS BEING PERFORMED BY NUS CORP. UNDER AN ARCS CONTRACT TO EPA.

A MORE DETAILED DESCRIPTION OF THE SITE HISTORY CAN BE FOUND IN SECTION 1.4 OF THE REMEDIAL INVESTIGATION REPORT.

## B. ENFORCEMENT HISTORY

ON APRIL 4, 1982, EPA SENT GENERAL NOTICE LETTERS TO 18 ENTITIES IT BELIEVED WERE RESPONSIBLE PARTIES. ON JANUARY 22, 1991, BASED ON NEWLY ACQUIRED INFORMATION, EPA NOTIFIED APPROXIMATELY 21 PARTIES WHO EITHER OWNED OR OPERATED THE FACILITY, GENERATED WASTES THAT WERE SHIPPED TO THE FACILITY, ARRANGED FOR THE DISPOSAL OF WASTES AT THE FACILITY, OR TRANSPORTED WASTES TO THE FACILITY OF THEIR POTENTIAL LIABILITY WITH RESPECT TO THE SITE. SOME OF THE 21 PARTIES NAMED IN THE JANUARY, 1991 LETTERS HAD BEEN PREVIOUSLY NOTIFIED IN THE 1982 LETTERS. AN ADDITIONAL OWNER/OPERATOR WAS NOTIFIED ON JUNE 21, 1991 BASED ON NEW INFORMATION SUPPLIED BY EXISTING PRPS. ON JULY 22, 1991, ELEVEN PARTIES WERE REMOVED FROM THE PRP LIST. EPA THEREFORE, CONSIDERS TWENTY PARTIES POTENTIALLY LIABLE TO PERFORM OR PAY FOR THE CLEANUP OF THE SITE. EPA GENERALLY CONDUCTS NEGOTIATIONS WITH POTENTIALLY RESPONSIBLE PARTIES (PRPS) AS SOON AS POSSIBLE REGARDING THE SETTLEMENT OF THEIR LIABILITY AT THE SITE. THE PRPS HAVE FORMED A STEERING COMMITTEE AND SUBSTANTIAL DISCUSSIONS BETWEEN EPA AND THE STEERING COMMITTEE HAVE TAKEN PLACE.

THE PRPS HAVE BEEN ACTIVE IN THE REMEDY SELECTION PROCESS FOR THIS SITE. TECHNICAL COMMENTS PRESENTED BY PRPS DURING THE PUBLIC COMMENT PERIOD ARE SUMMARIZED IN THE RESPONSIVENESS SUMMARY, AND THE SUMMARY AND WRITTEN COMMENTS HAVE BEEN INCLUDED IN THE ADMINISTRATIVE RECORD.

**#CP**

### **III. COMMUNITY PARTICIPATION**

THROUGHOUT THE SITE'S HISTORY, COMMUNITY CONCERN AND INVOLVEMENT HAS BEEN HIGH. EPA HAS KEPT THE COMMUNITY AND OTHER INTERESTED PARTIES APPRIZED OF THE SITE ACTIVITIES THROUGH INFORMATIONAL MEETINGS, FACT SHEETS, PRESS RELEASES AND PUBLIC MEETINGS WHICH HAVE BEEN HELD ON AN ALMOST MONTHLY BASIS SINCE 1986. THESE MEETINGS SERVED TO UPDATE THE PUBLIC REGARDING THE PROGRESS OF VARIOUS ASPECTS OF THE CLEANUP, INCLUDING THE GROUNDWATER RI/FS.

DURING 1986, EPA RELEASED A COMMUNITY RELATIONS PLAN WHICH OUTLINED A PROGRAM TO ADDRESS COMMUNITY CONCERNS AND KEEP CITIZENS INFORMED ABOUT AND INVOLVED IN ACTIVITIES DURING THE PLANNING AND EXECUTION OF REMEDIAL ACTIVITIES.

UPON THE START OF CONSTRUCTION OF THE CAP AND DIVERSION TRENCH ON-SITE IN 1989, EPA INTENSIFIED ITS COMMUNITY RELATIONS EFFORTS IN RESPONSE TO PUBLIC CONCERNS ABOUT SAFETY ISSUES RELATED TO THE CLEANUP. FOR A SEVERAL MONTH PERIOD, WEEKLY MEETINGS WERE HELD WITH REPRESENTATIVES OF THE POLICE AND FIRE DEPARTMENTS, AS WELL AS WITH CONCERN CITIZENS AND REPRESENTATIVES OF ORGANIZED LABOR.

ON JUNE 27, 1991 EPA MADE THE ADMINISTRATIVE RECORD AVAILABLE FOR PUBLIC REVIEW AT EPA'S OFFICES IN BOSTON AND AT THE ASHLAND PUBLIC LIBRARY. EPA PUBLISHED A NOTICE AND BRIEF ANALYSIS OF THE PROPOSED PLAN IN THE MIDDLESEX NEWS ON JUNE 21, 1991.

ON JUNE 26, 1991, EPA HELD AN INFORMATIONAL MEETING TO DISCUSS THE RESULTS OF THE REMEDIAL INVESTIGATION AND THE CLEANUP ALTERNATIVES PRESENTED IN THE FEASIBILITY STUDY AND TO PRESENT THE AGENCY'S PROPOSED PLAN. ALSO DURING THIS MEETING, THE AGENCY ANSWERED QUESTIONS FROM THE PUBLIC. FROM JUNE 27 TO JULY 26, 1991 THE AGENCY HELD A 30 DAY PUBLIC COMMENT PERIOD TO ACCEPT PUBLIC COMMENT ON THE ALTERNATIVES PRESENTED IN THE FEASIBILITY STUDY AND THE PROPOSED PLAN AND ON ANY OTHER DOCUMENTS PREVIOUSLY RELEASED TO THE PUBLIC. ON JULY 18, 1991, THE AGENCY HELD A PUBLIC MEETING TO DISCUSS THE PROPOSED PLAN AND TO ACCEPT ANY ORAL COMMENTS. A TRANSCRIPT OF THIS MEETING AND THE COMMENTS AND THE AGENCY'S RESPONSE TO COMMENTS ARE INCLUDED IN THE ATTACHED RESPONSIVENESS SUMMARY, APPENDIX I.

## **#SROU**

### **IV. SCOPE AND ROLE OF OPERABLE UNIT (OU) OR RESPONSE ACTION**

THE ROD FOR THE FIRST OPERABLE UNIT AT NYANZA WAS SIGNED ON SEPTEMBER 4, 1985. THIS SOURCE CONTROL REMEDY CALLED FOR THE EXCAVATION OF OUTLYING ON-SITE SLUDGES AND THEIR CONSOLIDATION UNDER AN IMPERMEABLE CAP. THE CONSTRUCTION OF THIS REMEDY IS NOW NEARING COMPLETION. THE THIRD OPERABLE UNIT, DEALING WITH CONTAMINATION OF THE SUDBURY RIVER AND ITS TRIBUTARIES, REMAINS IN THE RI/FS STAGE AT THIS TIME.

THE SELECTED OU II GROUNDWATER REMEDY WAS DEVELOPED FROM COMPONENTS OF DIFFERENT MANAGEMENT OF MIGRATION ALTERNATIVES TO OBTAIN AN APPROACH FOR GROUNDWATER REMEDIATION. THE SELECTED REMEDY IS AN INTERIM REMEDY. AN INTERIM REMEDY IS DESIGNED TO TAKE ACTION TO PROTECT HUMAN HEALTH AND THE ENVIRONMENT IN THE SHORT TERM WHILE ADDITIONAL INFORMATION IS COLLECTED TO BETTER ASSESS THE AQUIFER AND CONTAMINANT RESPONSE TO REMEDIATION EFFORTS. THE INTERIM REMEDY WILL OPERATE FOR A MINIMUM OF 5 YEARS AFTER WHICH TIME A FINAL REMEDIAL ACTION WILL BE DEVELOPED. A FINAL RECORD OF DECISION (ROD) FOR GROUNDWATER WILL BE BASED ON THE DATA COLLECTED DURING THE DESIGN, OPERATION, AND MONITORING OF THE INTERIM REMEDY. ADDITIONAL INTERIM REMEDIAL ACTION(S) MAY BE PROPOSED IF DATA COLLECTED PRIOR TO THE FINAL ROD WARRANTS.

IN SUMMARY, THE REMEDY PROVIDES FOR: 1) EXTRACTING CONTAMINATED GROUNDWATER FROM THE NORTHERN PORTION OF THE SITE NEAR THE RAILROAD TRACKS AND INDUSTRIAL PARK, AND OPTIONALLY AT THE SOUTHERN BORDER OF THE CAP NOW UNDER CONSTRUCTION ON MEGUNKO HILL FOR A MINIMUM OF 5 YEARS; 2) TREATING THE GROUNDWATER WITH A COMBINATION OF PHYSICAL AND CHEMICAL PROCESSES; 3) DISCHARGING THE TREATED WATER INTO THE SUDBURY RIVER; 4) USING INSTITUTIONAL AND ACCESS CONTROLS TO LIMIT EXPOSURE TO CONTAMINANTS; 5) PERFORMING PUMP TESTS IN THE EASTERN PORTION OF THE PLUME TO HELP DETERMINE THE FEASIBILITY OF CLEANING UP GROUNDWATER IN THIS AREA AT SOME FUTURE POINT; 6) INSTALLING ADDITIONAL DEEP BEDROCK WELLS TO MORE FULLY DEFINE THE DEPTHS AND LOCATIONS TO WHICH CONTAMINANTS MAY HAVE MIGRATED; 7) PERFORMING CONTINUING MONITORING OF SELECTED EXISTING RESIDENTIAL AND MONITORING WELLS AND LIMITED SURFACE WATER TESTING TO TRACK ANY FURTHER PROGRESS OF THE PLUME; 8) INSPECTING THE MEGUNKO ROAD WATER LINE; AND 9) PERFORMING CERTAIN PRE-DESIGN STUDIES TO AID IN THE DESIGN OF THE SELECTED REMEDY.

THE FIRST OPERABLE UNIT ADDRESSED CONTAMINATED SLUDGES AND SOILS BY EXCAVATING THEM FROM OUTLYING AREAS, AND CONSOLIDATING THEM WITH SLUDGES ALREADY ON MEGUNKO HILL UNDER AN IMPERMEABLE CAP. THE FIRST OPERABLE UNIT ROD ALSO INCLUDED AN UPGRADIENT DIVERSION TRENCH TO PRECLUDE CONTACT WITH GROUNDWATER AND SURFACE WATER RUNOFF WITH THE BURIED MATERIAL. CONSTRUCTION OF THE FIRST OPERABLE UNIT REMEDY IS EXPECTED TO BE COMPLETED IN LATE 1991.

THE SECOND OPERABLE UNIT INTERIM REMEDIAL ACTION WILL SERVE TO COLLECT DATA TO REFINE THE CLEANUP TIME ESTIMATES FOR THE FINAL RECORD OF DECISION, AND WILL IN THE INTERIM ADDRESS THE FOLLOWING PRINCIPAL THREATS TO HUMAN HEALTH AND THE ENVIRONMENT POSED BY THE SITE: MIGRATION OF CONTAMINANTS IN GROUNDWATER, RISKS TO HUMAN HEALTH ASSOCIATED WITH POTENTIAL FUTURE CONSUMPTION AND DIRECT CONTACT WITH GROUNDWATER, RISKS FROM PRESENT AND POTENTIAL FUTURE INHALATION OF EVAPORATED GROUNDWATER CONTAMINANTS, AND DEGRADATION OF THE SUDBURY RIVER AND WETLANDS DUE TO THE NATURAL DISCHARGE OF CONTAMINATED GROUNDWATER.

## **#SSC**

### **V. SUMMARY OF SITE CHARACTERISTICS**

#### A. GENERAL

CHAPTER 2 OF THE FEASIBILITY STUDY CONTAINS AN OVERVIEW OF THE REMEDIAL INVESTIGATION. THE SIGNIFICANT FINDINGS OF THE REMEDIAL INVESTIGATION ARE SUMMARIZED BELOW. THE RI REPORT UTILIZED INFORMATION DEVELOPED BY PREVIOUS STUDIES AND INFORMATION DEVELOPED AS PART OF A TWO-PHASED FIELD PROGRAM CONDUCTED SPECIFICALLY TO EVALUATE THE NYANZA II GROUNDWATER STUDY. THE SPECIFIC OBJECTIVES OF THESE FIELD INVESTIGATION ACTIVITIES ARE SUMMARIZED BELOW:

- CHARACTERIZE THE HYDRO GEOLOGIC REGIME, INCLUDING THE GEOLOGIC DEPOSITS UNDERLYING THE

STUDY AREA, THE DIRECTION AND RATE OF GROUNDWATER FLOW, AND THE INTERACTION BETWEEN GROUNDWATER AND SURFACE WATER IN THE WETLANDS AND THE SUDBURY RIVER;

- ASSESS THE NATURE, DISTRIBUTION, AND MIGRATION OF CONTAMINANTS IN GROUNDWATER, SURFACE WATER, SEDIMENT, SUBSURFACE SOILS, AND BEDROCK;
- ASSESS THE DEGREE TO WHICH FUTURE MIGRATION OF CONTAMINANTS MAY POSE A THREAT TO PUBLIC HEALTH, WELFARE, AND THE ENVIRONMENT; AND
- OBTAIN GROUNDWATER QUALITY DATA TO ASSESS THE APPLICABILITY OF GROUNDWATER TREATMENT TECHNOLOGIES FOR THE FS.

TO ACHIEVE THE ABOVE OBJECTIVES, THE TWO-PHASED FIELD PROGRAM COMMENCED IN FEBRUARY 1988 AND CONTINUED UNTIL JUNE 1988, WITH SUBSEQUENT WATER LEVEL MEASUREMENTS IN JUNE, OCTOBER AND NOVEMBER OF THE SAME YEAR. THE SECOND PHASE OF THE PROGRAM WAS CONDUCTED FROM SEPTEMBER OF 1989 UNTIL FEBRUARY 1990. THE ANALYTICAL DATA FROM THE TWO PHASES ARE GENERALLY REFERRED TO AS "1988" OR "1990" DATA. THE FOLLOWING FIELD ACTIVITIES WERE CONDUCTED AS PART OF THESE INVESTIGATIVE EFFORTS:

- TOPOGRAPHIC AND PROPERTY LOCATION SURVEY;
- GEOPHYSICAL INVESTIGATIONS INCLUDING SEISMIC REFRACTION, ELECTROMAGNETIC AND RESISTIVITY SURVEYS;
- EXPLORATORY BORINGS IN THE VAULT AND LOWER INDUSTRIAL AREA TO AUGMENT OPERABLE UNIT I DATA;
- SUBSURFACE DRILLING, AND MONITORING WELL AND WELL POINT INSTALLATION;
- CHEMICAL SAMPLING OF GROUNDWATER, SURFACE WATER, SUBSURFACE SOIL, AND SEDIMENT
- AQUIFER PERMEABILITY TESTING INCLUDING SLUG TESTING AND PACKER TESTING;
- WATER ELEVATION MEASUREMENT;
- WELL INVENTORY;
- TREATABILITY STUDIES;
- ECOLOGICAL RISK ASSESSMENT; AND
- PUBLIC HEALTH RISK ASSESSMENT.

THE RESULTS OF THESE EFFORTS ARE PRESENTED IN DETAIL IN THE RI REPORT. PLATE 1 IS A BASE MAP SHOWING ALL MONITORING WELLS AND OTHER FEATURES OF THE STUDY AREA. THE TREATABILITY STUDY RESULTS WERE PRESENTED AND DISCUSSED IN THE 1990 "TREATABILITY STUDY EVALUATION" PERFORMED FOR EPA BY EBASCO SERVICES, INC..

#### B. TOPOGRAPHY

THE STUDY AREA LIES WITHIN THE NEW ENGLAND PHYSIOGRAPHIC PROVINCE. THE TOPOGRAPHY IS STRONGLY INFLUENCED BY UNDERLYING BEDROCK AND HAS BEEN SHAPED BY GLACIATION INTO ROLLING HILLS DISSECTED BY POSTGLACIAL DRAINAGE SYSTEMS. THICK GLACIAL DEPOSITS TYPICALLY OVERLIE THE BEDROCK IN VALLEYS AND AREAS OF LOW RELIEF, WHILE THINNER DEPOSITS BLANKET SLOPES AND UPLAND AREAS. SURFACE ELEVATIONS RANGE FROM OVER 350 FEET ABOVE MEAN SEA LEVEL (MSL) ON MEGUNKO HILL TO 180 FEET MSL ALONG THE SUDBURY RIVER.

TOPOGRAPHIC FEATURES OF INTEREST IN THE STUDY AREA INCLUDE:

- THE NORTHERN FLANK OF MEGUNKO (ALTERNATE SPELLING: MAGUNKO) HILL, WHICH DOMINATES THE SOUTHWESTERN CORNER OF THE STUDY AREA. THE HILL SECTION OF THE FORMER NYANZA PROPERTY IS



LOCATED HERE (SEE FIGURE 1-2). THE LANDFILL CONSTRUCTED UNDER THE OPERABLE UNIT I ROD HAS SIGNIFICANTLY ALTERED THE TOPOGRAPHY OF THE MEGUNKO HILL AREA.

- THE LOWER INDUSTRIAL AREA LOCATED ALONG MEGUNKO ROAD.
- THE WETLAND NEAR THE EASTERN BOUNDARY OF THE FORMER NYANZA PROPERTY. THIS WETLAND IS BISECTED BY AN ABANDONED TROLLEY BED EMBANKMENT. TROLLEY BROOK ORIGINATES ON MEGUNKO HILL AND FLOWS ALONG THE WESTERN EMBANKMENT OF THE TROLLEY BED AND INTO A WETLAND NEAR MEGUNKO ROAD. THE EASTERN WETLAND LIES EAST OF THE TROLLEY BED AND MERGES WITH THE TROLLEY BROOK WETLAND VIA A CULVERT. TROLLEY BROOK FLOWS NORTHEASTERLY ALONG THE WESTERN SIDE OF THE TROLLEY BED, UNDER MEGUNKO ROAD, AND INTO CHEMICAL BROOK. THE TROLLEY BROOK WETLAND WAS REMEDIATED UNDER OPERABLE UNIT I DURING 1990.
- THE WESTERN WETLAND IN THE NORTHWESTERN CORNER OF THE FORMER NYANZA PROPERTY, WHICH FORMS THE HEADWATER OF AN INTERMITTENT STREAM, CHEMICAL BROOK. CHEMICAL BROOK FLOWS ALONG THE NORTHERN BOUNDARY OF THE NYANZA PROPERTY PARALLEL TO THE CONRAIL RAILROAD TRACKS, CONVERGES WITH TROLLEY BROOK, AND PRESENTLY FLOWS NORTHEASTERLY THROUGH AN UNDERGROUND CULVERT TO ITS CONFLUENCE WITH THE SUDBURY RIVER NEAR CONCORD STREET. THE WESTERN WETLAND AND CHEMICAL BROOK WERE REMEDIATED IN 1990 AS PART OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH OPERABLE UNIT I.
- A BROAD, LOW-LYING AREA LOCATED BETWEEN THE SUDBURY RIVER TO THE NORTH AND MEGUNKO HILL TO THE SOUTH. THIS AREA IS BISECTED BY THE CONRAIL RAILROAD TRACKS. THE SUDBURY RIVER FLOWS EASTERLY TO THE MYRTLE STREET DAM AND SOUTHEASTERLY DOWNSTREAM OF THE DAM.
- THE SUDBURY RIVER, WHICH FLOWS INTO THE FRAMINGHAM RESERVOIR NO. 2 (SEE FIGURE 1-2). CLASSIFIED IN 1872 AS AN EMERGENCY WATER SUPPLY FOR THE METROPOLITAN BOSTON AREA, THE RESERVOIR HAS NOT BEEN USED SINCE 1946. THE SUDBURY RIVER JOINS THE ASSABET AND CONCORD RIVER SYSTEMS, WHICH FLOW NORTHEAST INTO THE MERRIMACK RIVER LOCATED IN THE NORTHEASTERN PART OF THE STATE. THE SUDBURY RIVER IS BEING INVESTIGATED IN CONJUNCTION WITH THE THIRD OPERABLE UNIT FOR THE NYANZA SITE.

### C. GEOLOGY

THE SITE DIRECTLY OVERLIES GLACIAL SEDIMENTS, WHICH IN TURN OVERLIE GRANITIC BEDROCK. THE BEDROCK SURFACE IS UNDULATING AND SLOPES DOWNWARD FROM MEGUNKO HILL TOWARD THE SUDBURY RIVER WITH A SMALL TROUGH PARALLELING THE SUDBURY RIVER IN A GENERAL EAST-WEST ORIENTATION BETWEEN PLEASANT STREET AND THE RAILROAD TRACKS. DEPTH TO BEDROCK GENERALLY INCREASES FROM THE HILLSIDE (5 TO 10 FEET) TOWARD THE LOWLANDS AND THE SUDBURY RIVER (20 TO 50 FEET). THE GREATEST DEPTHS TO BEDROCK (50 TO 100 FEET) OCCUR IN WHAT IS INTERPRETED AS A BEDROCK DEPRESSION, OR TROUGH, PARALLEL TO THE SOUTHERN SHORE OF THE SUDBURY RIVER AND THEN TRENDING SOUTH IN THE GENERAL AREA NEAR THE INTERSECTION OF PARK ROAD AND SUMMER STREET.

BEDROCK CONTOURS WERE DEVELOPED FROM GEOPHYSICAL SOUNDINGS, BEDROCK CORINGS, AND REFUSALS IN OVERBURDEN BORINGS (SEE FIGURE 5-1). THE HIGHEST ELEVATIONS, ALONG MEGUNKO HILL, DECREASE RADIALY OUT FROM THE HILL INTO A VALLEY IN THE LOWLANDS BEFORE BEGINNING TO RISE AGAIN ON THE NORTH SHORE OF THE SUDBURY RIVER. A MEANDERING BEDROCK TROUGH EXISTS IN THE CENTER OF THE STUDY AREA AND ROUGHLY PARALLELS THE SUDBURY RIVER. THE TROUGH PROBABLY REPRESENTS A PREGLACIAL RIVER COURSE FOR THE SUDBURY RIVER.

THE TOTAL OBSERVED THICKNESS OF GLACIAL SEDIMENTS VARIES FROM 10.8 FEET (MW-10B) TO GREATER THAN 110 FEET (MW-404A). GLACIAL SEDIMENT COVER IS GENERALLY THINNEST ON MEGUNKO HILL AND THICKEST IN THE BEDROCK TROUGH.

THE TILL CONSISTS OF A NON-STRATIFIED AND POORLY GRADED MIXTURE OF CLAY/SILT, SAND, GRAVEL, COBBLES, AND BOULDERS. IT CAN BE DEPOSITED SUBGLACIALLY DURING GLACIER ADVANCES, OR AS DRAPED DEPOSITS WHEN ENTRAINMENT DEBRIS MELTS OUT DURING GLACIAL RECESSIONS. GLACIAL TILL OCCURS ON MEGUNKO HILL ABOVE AN ELEVATION OF APPROXIMATELY 200 FEET MSL AS OBSERVED IN A ROAD CUT ON THE NORTH FLANK OF MEGUNKO HILL.

GLACIAL LAKE DEPOSITS COVER THE LOWLANDS TO THE NORTH ON BOTH SIDES OF THE SUDBURY RIVER. THE

DEPOSITS RANGE IN THICKNESS FROM 5 TO 50 FEET BUT COMMONLY OCCUR IN DEPOSITS 20 TO 40 FEET THICK ACROSS THE LOWLANDS, WITH THE THICKER DEPOSITS IN THE BEDROCK TROUGH. TYPICALLY, THREE TYPES OF MATERIALS COMPRISE THESE GLACIAL LAKE DEPOSITS: BOULDERS AND COBBLES, GLACIOFLUVIAL SEDIMENTS OR GLACIOLACUSTRINE SEDIMENTS BASED ON THE DOMINANT DEPOSITIONAL ENVIRONMENTS IN WHICH THEY WERE CREATED.

#### D. HYDROGEOLOGY

THIS SECTION SUMMARIZES THE HYDRO GEOLOGIC FINDINGS FOR THE STUDY AREA AND INCLUDES A SUMMARY OF THE HYDRO GEOLOGIC EVALUATION. ADDITIONAL DETAILS AND SPECIFIC DATA SUPPORTING THE HYDRO GEOLOGIC EVALUATION ARE PRESENTED IN THE RI.

GROUNDWATER FLOWS RADially OFF MEGUNKO HILL. WEST OF THE MW-113 COUPLET, FLOW IS TO THE NORTH TOWARD THE SUDBURY RIVER. TO THE EAST, GROUNDWATER FLOW IS NORTHEASTERLY, BECOMING EAST-NORTHEASTERLY NEAR MW-201 (SEE FIGURE 5-2). THIS SHIFT MAY BE RELATED TO THE ELEVATED RIVER LEVELS CAUSED EITHER BY THE DAM AT MYRTLE STREET OR BY FLOW THROUGH THE BEDROCK TROUGH LOCATED NORTH OF THE NORTHEAST SECTIONS OF THE LOWER INDUSTRIAL AREA. DOWNWARD HYDRAULIC GRADIENTS ALONG THE SUDBURY RIVER BETWEEN MW-304B AND WP-105 ARE INDICATIVE OF INDUCED INFILTRATION FROM THE RIVER TO THE ADJACENT OVERBURDEN AQUIFER IN THE NORTH CENTRAL PART OF THE STUDY AREA. HOWEVER, DEPENDING ON THE RIVER STAGE AND PIEZOMETRIC HEAD, THE AREA AROUND MW-304B MAY PERIODICALLY DISCHARGE TO THE RIVER; THE LACK OF RIVER STAGE DATA PREVENTS FURTHER VERIFICATION OF THIS SCENARIO.

GROUNDWATER PROBABLY DISCHARGES TO THE SUDBURY RIVER ABOVE MW-304 AND BELOW THE MYRTLE STREET DAM; THE RIVER REACH IN BETWEEN IS LIKELY AN AREA OF INDUCED INFILTRATION FROM THE RIVER. THE PROBABILITY OF GROUNDWATER FLOW BENEATH THE RIVER IS VERY LOW BASED ON THE FOLLOWING:

- UPWARD GRADIENTS AT MW-305, MW-405, MW-408, WP-102 AND OCCASIONALLY AT MW-304;
- THE 15 TO 25 FOOT RISE IN BEDROCK OVER THE SHORT DISTANCES FROM THE SOUTHERN TO NORTHERN SHORES OF THE RIVER;
- THE PROBABLE DEFLECTION OF FLOW THROUGH THE BEDROCK TROUGH; AND

CONSISTENTLY HIGHER GROUNDWATER ELEVATIONS ON THE NORTH SHORE OF THE RIVER COMPARED TO THE SOUTH SHORE.

MEASURED HORIZONTAL HYDRAULIC GRADIENTS IN THE OVERBURDEN RANGED BETWEEN 0.234 AND 0.268 FT/FT IN THE UPLAND PORTIONS OF THE SITE AND BETWEEN 0.004 TO 0.006 FT/FT IN THE LOWLAND PORTIONS. BEDROCK HORIZONTAL HYDRAULIC GRADIENTS RANGED BETWEEN 0.112 TO 0.230 FT/FT IN THE UPLANDS AND 0.003 TO 0.007 FT/FT IN THE LOWLANDS.

#### E. CONTAMINATION OF AFFECTED MEDIA

##### 1. GROUNDWATER

THE GROUNDWATER ASSESSMENT WAS BASED ON THE 1988 AND 1990 SAMPLING DATA FROM WELLS INSTALLED DURING THESE FIELD INVESTIGATIONS AND WELLS INSTALLED DURING PREVIOUS INVESTIGATIONS. MOST MONITORING WELLS WERE SCREENED AT TWO DIFFERENT DEPTHS. DEPENDING ON THEIR DEPTH, WELLS INSTALLED DURING THE OPERABLE UNIT II REMEDIAL INVESTIGATION WERE DESIGNATED BY WELL SEQUENCE NUMBERS GREATER THAN 100. OVERBURDEN WELLS ARE DESIGNATED WITH THE SUFFIX "B", AND BEDROCK WITH THE SUFFIX "A". EXISTING WELLS INSTALLED PRIOR TO OPERABLE UNIT II WERE DESIGNATED BY WELL IDENTIFICATION NUMBERS BELOW 100. THESE OVERBURDEN AND BEDROCK WELLS WERE GENERALLY DIFFERENTIATED BY THE SUFFIX "A" OR "B", RESPECTIVELY.

THE RESULTS OF THE 1988 AND 1990 GROUNDWATER SAMPLING PROGRAM CONTAMINATION ASSESSMENT MAY BE SUMMARIZED AS FOLLOWS:

- MAJOR VOLATILE ORGANIC CONTAMINANTS INCLUDE 1,2-DCE, TCE, AND CHLOROBENZENE. THESE THREE COMPOUNDS GENERALLY EXCEED THEIR RESPECTIVE MCLS OR MCLGS IN WELLS WHERE THEY WERE DETECTED.

- MAJOR SEMIVOLATILE ORGANIC CONTAMINANTS INCLUDE 1,4-DICHLOROBENZENE, 1,2-DICHLOROBENZENE, NITROBENZENE, 1,2,4-TRICHLOROBENZENE, AND ANILINE. ALL OF THESE CONTAMINANTS WERE DETECTED AT NUMEROUS SAMPLING LOCATIONS AT CONCENTRATIONS EXCEEDING 1,000 UG/L. CONCENTRATIONS OF 1,2-DICHLOROBENZENE, 1,4-DICHLOROBENZENE, AND 1,2,4-TRICHLOROBENZENE EXCEEDED EXISTING OR PROPOSED MCLS IN MANY WELLS IN WHICH THEY WERE DETECTED.
- VOC AND SVOC GROUNDWATER CONTAMINATION APPEAR TO ORIGINATE FROM AT LEAST THREE SITE AREAS. THE MAJOR SOURCE APPEARS TO BE THE VAULT NEAR MW-ERT-2, AS SEEN BY THE VERY HIGH VOC AND SVOC CONCENTRATIONS OBSERVED DOWNGRAIDENT IN MW-113. SECONDARY SOURCES APPEAR TO BE MEGUNKO HILL AND THE NORTHEASTERN LOWER INDUSTRIAL AREA. THE VAULT WAS EXCAVATED DURING A REMOVAL ACTION IN 1987-1988. IN ADDITION, METALS BEARING SLUDGE DEPOSITED ON MEGUNKO HILL AND IN THE NORTHEAST LOWER INDUSTRIAL PARK ARE CURRENTLY SCHEDULED TO BE REMEDIATED AS PART OF OPERABLE UNIT I. FURTHERMORE, IT IS UNCERTAIN AS TO WHETHER THE PATTERNS OF VOCs AND SVOCs IN SOIL BORINGS TAKEN FROM THE LOWER INDUSTRIAL AREA REFLECT GROUNDWATER CONTAMINANT MIGRATION IN THE OVERBURDEN AND BEDROCK FROM UPGRADIENT SOURCES OR PAST DISPOSAL PRACTICES IN THE IMMEDIATE AREA OF THE BORINGS.
- THE GENERAL DISTRIBUTIONS OF VOCs AND SVOCs SUGGEST A HIGHLY CONTAMINATED GROUNDWATER PLUME APPARENTLY ORIGINATING FROM THE GENERAL AREA OF THE VAULT AND MIGRATING IN AN EASTERLY AND NORTHEASTERLY DIRECTION TOWARD MW-405 AND THE SUDBURY RIVER.
- IMMEDIATELY DOWNGRAIDENT FROM THE VAULT AND MEGUNKO HILL, VOC AND SVOC CONTAMINATION IS GENERALLY ONE TO THREE ORDERS-OF-MAGNITUDE HIGHER IN THE SHALLOW BEDROCK THAN IN THE OVERBURDEN. ELSEWHERE, CONCENTRATIONS ARE MORE EVENLY DISTRIBUTED BETWEEN THE OVERBURDEN AND BEDROCK. THE HIGH CONCENTRATIONS IMMEDIATELY DOWNGRAIDENT OF THE VAULT SUGGESTS THE PAST OR CURRENT PRESENCE OF NONAQUEOUS PHASE LIQUID.
- THE SIGNIFICANT CHANGES IN BEDROCK CONTOUR ELEVATIONS BETWEEN MW-405 AND MW-403 AND VERTICAL GRADIENT DATA SUGGEST THAT THE CONTAMINANT PLUME IS NOT MIGRATING UNDER THE RIVER TOWARDS MW-403, BUT IS PROBABLY DISCHARGING TO THE RIVER. ELEVATED SODIUM LEVELS IN WELLS TO THE SOUTHEAST OF MW-405 MIGHT SUPPORT THE HYPOTHESIS OF SOME PLUME MIGRATION IN THIS DIRECTION.
- SEVERAL PESTICIDES WERE DETECTED IN ONLY A LIMITED NUMBER OF WELLS SAMPLED, AND THESE AT RELATIVELY LOW CONCENTRATIONS. INCLUDED WERE HEPTACHLOR, 4,4-DDT, BETA-BHC, DELTA-BHC, DIELDRIN, AND GAMMA-CHLORDANE. HOWEVER, HEPTACHLOR CONCENTRATIONS EXCEEDED ITS MCLG IN ALL FIVE WELLS WHERE IT WAS DETECTED. BECAUSE OF THE LOW CONCENTRATIONS OF PESTICIDES DETECTED AND THEIR LIMITED DISTRIBUTION, IT IS DIFFICULT TO LOCATE SPECIFIC SOURCES ON PESTICIDE CONTAMINATION OR TO COMPLETELY CONFIRM A SITE ORIGIN.
- CADMIUM, LEAD, MERCURY, AND OTHER METALS WERE DETECTED IN A LIMITED NUMBER OF WELLS IN THE 1988 AND/OR 1990 SAMPLING PROGRAMS AT CONCENTRATIONS GREATER THAN METAL CONTAMINANTS IS LIMITED IN COMPARISON WITH THE DEGREE OF ORGANIC CONTAMINATION FOUND AT THE SITE. INORGANIC CONTAMINATION APPEARS TO ORIGINATE FROM SEVERAL SITE AREAS. ONE SOURCE EXISTS ON MEGUNKO HILL. OTHER SOURCES APPEAR TO BE IN THE WESTERN WETLAND, AND IN THE NORTHEASTERN LOWER INDUSTRIAL AREA SOUTH OF MW-109. CONTAMINATED SOILS AND SLUDGE DEPOSITS IN THOSE AREAS WERE REMEDIATED AS PART OF OPERABLE UNIT I.
- INORGANIC CONCENTRATION DISTRIBUTIONS BETWEEN THE OVERBURDEN AND SHALLOW BEDROCK WELLS APPEAR TO BE SOMEWHAT CONTAMINANT-SPECIFIC.
- SODIUM CONCENTRATION CONTOURS SUGGEST THAT IT IS POTENTIALLY A CONSERVATIVE (NON-ATTENUATED) SITE-RELATED CONTAMINANT. SODIUM CONCENTRATION CONTOURS ALSO SUPPORT THE HYPOTHESIS OF POTENTIAL GROUNDWATER AND ORGANIC CONTAMINANT TRANSPORT TO THE SOUTHEAST OF MW-302 AND MW-405 PARALLEL TO THE RIVER.

CONTOUR MAPS SHOWING THE PREVALENCE OF ANILINE, NITROBENZENE, DICHLOROBENZENE, AND TRICHLOROETHENE IN OVERBURDEN AND BEDROCK AQUIFERS ARE SHOWN IN FIGURES 5-3 THROUGH 5-10.

## 2. SURFACE WATER AND SEDIMENT

ANALYTICAL SURFACE WATER AND SEDIMENT RESULTS WERE DERIVED FROM THE LIMITED 1988 FIELD EFFORTS AND OTHER PREVIOUS STUDIES CONDUCTED AT THE SITE. THE SAMPLING LOCATIONS AND THE ANALYTICAL RESULTS FOR THESE MEDIA ARE PRESENTED IN THE RI REPORT ALONG WITH A MORE DETAILED PRESENTATION OF THE CONTAMINANT ASSESSMENT AND DISTRIBUTION. IT SHOULD BE NOTED THAT SURFACE WATER AND SEDIMENT ISSUES WILL BE ADDRESSED IN OPERABLE UNIT III.

THE RESULTS OF THE OPERABLE UNIT I AND II STUDIES INDICATE THAT BOTH SURFACE WATER AND SEDIMENT ARE CONTAMINATED WITH SITE-RELATED ORGANIC AND INORGANIC CONTAMINANTS. VOCS, SVOCs AND HEAVY METALS WERE ALL DETECTED IN THE SURFACE WATER OR SEDIMENT OF THE EASTERN AND WESTERN WETLANDS, TROLLEY AND CHEMICAL BROOKS, THE SUDBURY RIVER, AND NEAR THE CONFLUENCE OF CHEMICAL BROOK AND THE SUDBURY RIVER.

## **#SSR**

### **VI. SUMMARY OF SITE RISKS**

A RISK ASSESSMENT (RA) WAS PERFORMED TO ESTIMATE THE PROBABILITY AND MAGNITUDE OF POTENTIAL ADVERSE HUMAN HEALTH AND ENVIRONMENTAL EFFECTS FROM EXPOSURE TO CONTAMINANTS ASSOCIATED WITH THE SITE. THE PUBLIC HEALTH RISK ASSESSMENT FOLLOWED A FOUR STEP PROCESS: 1) CONTAMINANT IDENTIFICATION WHICH IDENTIFIED THOSE HAZARDOUS SUBSTANCES WHICH, GIVEN THE SPECIFICS OF THE SITE WERE OF SIGNIFICANT CONCERN; 2) EXPOSURE ASSESSMENT, WHICH IDENTIFIED ACTUAL OR POTENTIAL EXPOSURE PATHWAYS, CHARACTERIZED THE POTENTIALLY EXPOSED POPULATIONS, AND DETERMINED THE EXTENT OF POSSIBLE EXPOSURE; 3) TOXICITY ASSESSMENT, WHICH CONSIDERED THE TYPES AND MAGNITUDE OF ADVERSE HEALTH EFFECTS ASSOCIATED WITH EXPOSURE TO HAZARDOUS SUBSTANCES, AND 4) RISK CHARACTERIZATION, WHICH INTEGRATED THE THREE EARLIER STEPS TO SUMMARIZE THE POTENTIAL AND ACTUAL RISKS POSED BY HAZARDOUS SUBSTANCES AT THE SITE, INCLUDING CARCINOGENIC AND NON-CARCINOGENIC RISKS. THE RESULTS OF THE PUBLIC HEALTH RISK ASSESSMENT FOR THE NYANZA CHEMICAL WASTE DUMP SITE ARE DISCUSSED BELOW FOLLOWED BY THE CONCLUSIONS OF THE ENVIRONMENTAL RISK ASSESSMENT.

THE SUMMARY OF CONTAMINANTS OF CONCERN FOUND IN GROUNDWATER, SURFACE WATER AND SEDIMENT IS FOUND IN TABLE 6-1. THESE CONTAMINANTS CONSTITUTE A REPRESENTATIVE SUBSET OF THE CONTAMINANTS IDENTIFIED AT THE SITE DURING THE REMEDIAL INVESTIGATION. THE CONTAMINANTS OF CONCERN FOR EACH MEDIUM WERE SELECTED TO REPRESENT POTENTIAL SITE RELATED HAZARDS BASED ON TOXICITY, CONCENTRATION, FREQUENCY OF DETECTION, AND MOBILITY AND PERSISTENCE IN THE ENVIRONMENT. A SUMMARY OF THE HEALTH EFFECTS OF EACH OF THE CONTAMINANTS OF CONCERN CAN BE FOUND IN APPENDIX B OF THE RISK ASSESSMENT.

POTENTIAL HUMAN HEALTH EFFECTS ASSOCIATED WITH EXPOSURE TO THE CONTAMINANTS OF CONCERN WERE ESTIMATED QUANTITATIVELY THROUGH THE DEVELOPMENT OF SEVERAL HYPOTHETICAL EXPOSURE PATHWAYS. THESE PATHWAYS WERE DEVELOPED TO REFLECT THE POTENTIAL FOR EXPOSURE TO HAZARDOUS SUBSTANCES BASED ON THE PRESENT USES, POTENTIAL FUTURE USES, AND LOCATION OF THE SITE. THE FOLLOWING IS A BRIEF SUMMARY OF THE EXPOSURE PATHWAYS EVALUATED. A MORE THOROUGH DESCRIPTION CAN BE FOUND IN SECTION 4 OF THE RISK ASSESSMENT.

AT THE NYANZA OPERABLE UNIT II STUDY AREA, RISKS WERE ASSESSED FOR EXPOSURE TO CONTAMINANTS IN GROUNDWATER, SURFACE WATER, AND SEDIMENTS. TABLE 6-2 SUMMARIZES THE EXPOSURE PATHWAYS INVESTIGATED, ALONG WITH THE SOURCES OF DATA USED TO ASSESS EXPOSURE POINT CONCENTRATIONS.

ALTHOUGH GROUNDWATER IS THE MOST EXTENSIVELY CONTAMINATED MEDIUM AT THE SITE, THERE IS NO CURRENT EXPOSURE TO GROUNDWATER VIA INGESTION AS A DRINKING WATER SUPPLY. THE AREA IN THE VICINITY OF THE NYANZA SITE IS SUPPLIED BY A MUNICIPAL WATER SUPPLY WELLFIELD LOCATED APPROXIMATELY TWO MILES WEST OF THE SITE. EXPOSURE TO GROUNDWATER CONTAMINANTS THROUGH THE USE OF GROUNDWATER FOR DOMESTIC PURPOSES COULD OCCUR IN THE FUTURE IF THE AQUIFER WAS DEVELOPED FOR THIS PURPOSE. GROUNDWATER EXPOSURE THROUGH DOMESTIC USE IS ONLY POSSIBLE IN THE FUTURE IF WATER SUPPLY WELLS ARE INSTALLED IN THE SHALLOW OR BEDROCK AQUIFERS.

PEOPLE MAY ALSO BE EXPOSED TO GROUNDWATER IN RESIDENTIAL BASEMENTS, SINCE GROUNDWATER HAS BEEN FOUND TO MIGRATE INTO BASEMENTS. ALTHOUGH THE PRESENT RISK FROM EXPOSURE TO BASEMENT SEEPAGE CONTAMINATION IS REPORTEDLY LOW (BASED ON TRACE LEVELS OF CONTAMINATION OBSERVED DURING A SURVEY OF 6 BASEMENTS), RISKS WERE ASSESSED USING THE MEASURED LEVELS OF CONTAMINANTS FOUND IN THE

SHALLOW OVERBURDEN GROUNDWATER WELLS DURING THE 1988 AND 1990 INVESTIGATIONS AND PROJECTIONS REGARDING THEIR CONTRIBUTIONS TO INDOOR AIR LEVELS, TO PROVIDE A CONSERVATIVE ESTIMATE OF FUTURE RISKS THROUGH THIS PATHWAY. EXPOSURE TO SURFACE WATER AND SEDIMENT CONTAMINANTS MAY OCCUR VIA DERMAL CONTACT AND INGESTION UNDER EXISTING CONDITIONS, AS WELL AS IN THE FUTURE. THE POTENTIALLY EXPOSED POPULATIONS AND PATHWAYS OF EXPOSURE FOR EACH MEDIUM ARE DISCUSSED IN THE FOLLOWING SECTIONS.

#### A. GROUNDWATER EXPOSURE SCENARIOS

TWO SITUATIONS IN WHICH EXPOSURE TO GROUNDWATER MAY OCCUR IN THE NYANZA II STUDY AREA WERE CONSIDERED: GROUNDWATER AS A PUBLIC WATER SUPPLY, AND GROUNDWATER SEEPAGE INTO BASEMENTS.

##### 1. GROUNDWATER AS PUBLIC WATER SUPPLY

THE AREA IN THE VICINITY OF THE SITE IS SUPPLIED BY A PUBLIC WATER SUPPLY LOCATED OUTSIDE OF THE STUDY AREA. THEREFORE, LOCAL GROUNDWATER IS NOT CURRENTLY USED AS A DRINKING WATER SUPPLY. FUTURE DEVELOPMENT IN THE AREA, HOWEVER, MAY REQUIRE THE INSTALLATION OF NEW WELLS. IF WATER SUPPLY WELLS ARE INSTALLED IN THE FUTURE, EXPOSURE TO CONTAMINANTS PRESENT IN GROUNDWATER COULD OCCUR IN A VARIETY OF WAYS. THESE INCLUDE: 1) INGESTION; 2) INHALATION OF CHEMICALS RELEASED INTO AIR DURING HOUSEHOLD USES SUCH AS SHOWERING; AND 3) DERMAL ABSORPTION OF CHEMICALS FROM HOUSEHOLD WATER USES SUCH AS WASHING. THE ASSUMPTIONS MADE TO ASSESS EXPOSURE THROUGH THESE ROUTES ARE DESCRIBED IN TABLE 6-3.

FOR EACH PATHWAY EVALUATED, AN AVERAGE (MOST PROBABLE) AND A REASONABLE MAXIMUM EXPOSURE (REALISTIC WORST CASE) ESTIMATE WAS GENERATED CORRESPONDING TO EXPOSURE TO THE AVERAGE AND MAXIMUM CONCENTRATION DETECTED IN THAT PARTICULAR MEDIUM.

THE ESTIMATED GROUNDWATER CONCENTRATIONS DERIVED FROM THE 1988 AND 1990 DATA ARE SUMMARIZED IN TABLE 4-3 OF THE RISK ASSESSMENT WHICH IS INCLUDED AS AN APPENDIX III TO THIS ROD. INCLUDED IN TABLE 4-3 ARE THE ARITHMETIC MEAN AND MAXIMUM VALUES AND FREQUENCIES OF DETECTION OF CONTAMINANTS BROKEN OUT INTO INDIVIDUAL EXPOSURE AREAS: MEGUNKO HILL, THE VAULT AREA, AND THE DOWNGRADIENT AREA.

##### 2. GROUNDWATER SEEPAGE

THE SECOND GROUNDWATER EXPOSURE SCENARIO EVALUATED IS ASSOCIATED WITH SEEPAGE OF SHALLOW GROUNDWATER INTO RESIDENTIAL BASEMENTS. PREVIOUS RESIDENTIAL SAMPLING CONDUCTED BY NUS CORPORATION FOR EPA DETECTED LOW LEVELS OF CONTAMINANTS IN WATER COLLECTED FROM SEVERAL BASEMENTS DOWNGRADIENT OF THE SITE. IN ADDITION, AIR SAMPLES COLLECTED FROM BASEMENTS LOCATED DOWNGRADIENT OF THE SITE DID NOT INDICATE SIGNIFICANT AIR IMPACT FROM CONTAMINATED GROUNDWATER.

RESIDENTS OF HOUSES WITH BASEMENTS MAY COME INTO CONTACT WITH CONTAMINATED GROUNDWATER BASEMENT SEEPAGE. THE MOST LIKELY ROUTES OF EXPOSURE TO CONTAMINANTS AS A RESULT OF BASEMENT SEEPAGE ARE DERMAL CONTACT, INGESTION, AND INHALATION. ASSUMPTIONS USED TO ASSESS EXPOSURE THROUGH THESE PATHWAYS ARE DESCRIBED IN TABLE 6-4.

TO ESTIMATE EXPOSURE POINT CONCENTRATIONS OF PUDDLED WATER STANDING IN BASEMENTS OR OF SUBMERSIBLE PUMP DISCHARGES, IT WAS ASSUMED THAT THE CONTAMINANTS FOUND IN SHALLOW GROUNDWATER MONITORING WELLS IN THE DOWNGRADIENT AREA MIGRATED INTO RESIDENTIAL BASEMENTS. THUS, THE GROUNDWATER CONTAMINANT CONCENTRATIONS THAT COULD POTENTIALLY MIGRATE INTO BASEMENTS WERE ASSUMED TO BE THE SAME AS THE CONCENTRATIONS IN SHALLOW WELLS DEFINED AS OVERBURDEN WELLS. TABLE 6-5A AND 6-5B PRESENT 1988 AND 1990 EXPOSURE POINT CONCENTRATIONS, RESPECTIVELY, FOR BASEMENT SEEPAGE BASED UPON DATA SETS COMPRISED ONLY OF SAMPLES FROM DOWNGRADIENT OVERBURDEN WELLS.

INHALATION EXPOSURES DUE TO BASEMENT SEEPAGE WERE ASSESSED USING A MODEL DEVELOPED BY MURPHY TO ESTIMATE THE BASEMENT AIR CONCENTRATIONS FOR VOLATILE CONTAMINANTS ASSOCIATED WITH THE PRESENCE OF CONTAMINANTS IN SUMPS. FURTHER DETAIL ON THIS MODEL IS INCLUDED IN THE RISK ASSESSMENT.

##### 3. SURFACE WATER AND SEDIMENT EXPOSURE SCENARIOS

THE CONTAMINATED SURFACE WATER BODIES IN THE NYANZA II STUDY AREA ARE THE EASTERN WETLAND AND TROLLEY BROOK. THE MOST LIKELY POPULATION TO BE EXPOSED TO CONTAMINANTS AT THESE LOCATIONS ARE OLDER CHILDREN AND ADOLESCENTS WADING IN THE WATER. RISKS ASSOCIATED WITH DERMAL CONTACT AND INCIDENTAL INGESTION OF THE SURFACE WATER WERE CALCULATED FOR THIS MEDIUM. EXPOSURE PARAMETERS USED TO ASSESS RISK AT THESE LOCATIONS ARE SHOWN IN TABLE 6-6.

EXPOSURE POINT CONCENTRATIONS OF CONTAMINANTS AT THESE LOCATIONS WERE CALCULATED USING DATA FROM 1988 SAMPLES SW-101 (EASTERN WETLAND) AND SW-102 (TROLLEY BROOK) (SEE TABLE 6-7). THE MAXIMUM DETECTED CONCENTRATIONS AND ARITHMETIC MEANS WERE USED FOR THE RISK CALCULATIONS IN THE REALISTIC WORST CASE AND MOST PROBABLE CASE SCENARIOS, RESPECTIVELY. HOWEVER, WHERE THE DATA SET CONSISTED OF ONLY ONE SAMPLE, ONLY MOST PROBABLE CASE SCENARIOS WERE EVALUATED.

#### 4. EXPOSURE TO SUBSURFACE SOIL

POTENTIAL CONTAMINANT EXPOSURES AND RISKS ASSOCIATED WITH FUTURE EXPOSURES TO SUBSURFACE SOIL ARE DISCUSSED QUALITATIVELY IN SECTION 6.2 OF THE RISK ASSESSMENT. FOR EACH PATHWAY EVALUATED, AN AVERAGE AND A REASONABLE MAXIMUM EXPOSURE ESTIMATE WAS GENERATED CORRESPONDING TO EXPOSURE TO THE AVERAGE AND THE MAXIMUM CONCENTRATION DETECTED IN THAT PARTICULAR MEDIUM.

#### B. RISK CHARACTERIZATION

EXCESS LIFETIME CANCER RISKS WERE DETERMINED FOR EACH EXPOSURE PATHWAY BY MULTIPLYING THE EXPOSURE LEVEL WITH THE CHEMICAL SPECIFIC CANCER POTENCY FACTOR. CANCER POTENCY FACTORS HAVE BEEN DEVELOPED BY EPA FROM EPIDEMIOLOGICAL OR ANIMAL STUDIES TO REFLECT A CONSERVATIVE "UPPER BOUND" OF THE RISK POSED BY POTENTIALLY CARCINOGENIC COMPOUNDS. THAT IS, THE TRUE RISK IS VERY UNLIKELY TO BE GREATER THAN THE RISK PREDICTED. THE RESULTING RISK ESTIMATES ARE EXPRESSED IN SCIENTIFIC NOTATION AS A PROBABILITY (E.G.  $1 \times (10^{-6})$  FOR 1/1,000,000) AND INDICATE (USING THIS EXAMPLE), THAT AN INDIVIDUAL IS NOT LIKELY TO HAVE GREATER THAN A ONE IN A MILLION CHANCE OF DEVELOPING CANCER OVER 70 YEARS AS A RESULT OF SITE-RELATED EXPOSURE AS DEFINED TO THE COMPOUND AT THE STATED CONCENTRATION. CURRENT EPA PRACTICE CONSIDERS CARCINOGENIC RISKS TO BE ADDITIVE WHEN ASSESSING EXPOSURE TO A MIXTURE OF HAZARDOUS SUBSTANCES.

THE HAZARD QUOTIENT WAS ALSO CALCULATED FOR EACH PATHWAY AS EPA'S MEASURE OF THE POTENTIAL FOR NON-CARCINOGENIC HEALTH EFFECTS. THE HAZARD QUOTIENT IS CALCULATED BY DIVIDING THE EXPOSURE LEVEL BY THE REFERENCE DOSE (RFD) OR OTHER SUITABLE BENCHMARK FOR NON-CARCINOGENIC HEALTH EFFECTS. REFERENCE DOSES HAVE BEEN DEVELOPED BY EPA TO PROTECT SENSITIVE INDIVIDUALS OVER THE COURSE OF A LIFETIME AND THEY REFLECT A DAILY EXPOSURE LEVEL THAT IS LIKELY TO BE WITHOUT AN APPRECIABLE RISK OF AN ADVERSE HEALTH EFFECT. RFDs ARE DERIVED FROM EPIDEMIOLOGICAL OR ANIMAL STUDIES AND INCORPORATE UNCERTAINTY FACTORS TO HELP ENSURE THAT ADVERSE HEALTH EFFECTS WILL NOT OCCUR. THE HAZARD QUOTIENT IS OFTEN EXPRESSED AS A SINGLE VALUE (E.G. 0.3) INDICATING THE RATIO OF THE STATED EXPOSURE AS DEFINED TO THE REFERENCE DOSE VALUE (IN THIS EXAMPLE, THE EXPOSURE AS CHARACTERIZED IS APPROXIMATELY ONE THIRD OF AN ACCEPTABLE EXPOSURE LEVEL FOR THE GIVEN COMPOUND). THE HAZARD QUOTIENT IS ONLY CONSIDERED ADDITIVE FOR COMPOUNDS THAT HAVE THE SAME OR SIMILAR TOXIC ENDPOINTS (FOR EXAMPLE: THE HAZARD QUOTIENT FOR A COMPOUND KNOWN TO PRODUCE LIVER DAMAGE SHOULD NOT BE ADDED TO A SECOND WHOSE TOXIC ENDPOINT IS KIDNEY DAMAGE). THE RESULTING SUM IS REFERRED TO AS THE HAZARD INDEX.

TABLE 6-8 SUMMARIZES TOTAL CARCINOGENIC RISKS FOR DOWNGRAIENT AREAS FOR ALL PATHWAYS, WHILE TABLE 6-9 SUMMARIZES THE TOTAL NON-CARCINOGENIC RISK FOR DOWNGRAIENT AREAS FOR ALL PATHWAYS CONSIDERED. TABLES 6-1 THROUGH 6-6 OF THE RISK ASSESSMENT SUMMARIZE THE RISKS ASSOCIATED WITH THE MAJOR CONTAMINANTS OF CONCERN.

THIS SECTION SUMMARIZES THE CALCULATED CARCINOGENIC AND NON-CARCINOGENIC RISK FOR VARIOUS PATHWAYS, DESCRIBES WHICH CONTAMINANTS OF CONCERN CONTRIBUTE THE MOST TO THE CALCULATED RISK, AND COMPARES THE CALCULATED RISK TO EPA'S TARGET CARCINOGENIC RISK RANGE OF  $(10^{-4})$  TO  $(10^{-6})$  AND DISCUSS NON-CARCINOGENIC HAZARD INDEX AS IT RELATES TO THE VALUE WHERE ADVERSE NONCARCINOGENIC EFFECTS ARE NOT EXPECTED (HI LT 1).

#### 1. GROUNDWATER RISK CHARACTERIZATION.

POTENTIAL RISKS ASSOCIATED WITH POSSIBLE FUTURE USE OF GROUNDWATER AS A POTABLE WATER SUPPLY WAS

EVALUATED AT THREE LOCATIONS: THE DOWNGRAIENT, FORMER VAULT, AND MEGUNKO HILL AREAS.

DOWNGRAIENT AREA - THE CARCINOGENIC RISKS THAT MAY RESULT FROM GROUNDWATER INGESTION AT THIS LOCATION GREATLY EXCEED BOTH FEDERAL AND MASSACHUSETTS TARGET LEVELS. LIFETIME CANCER RISKS CALCULATED FROM THE 1988 DATA WERE  $2.5 \times (10^{-2})$  FOR THE MOST PROBABLE SCENARIO AND  $5.5 \times (10^{-2})$  FOR THE REALISTIC WORST CASE SCENARIO, WITH EXPOSURES TO N-NITROSODI-N-PROPYLAMINE ACCOUNTING FOR THE BULK OF THE RISK. THE CANCER RISKS ASSOCIATED WITH CONSUMPTION OF DOWNGRAIENT GROUNDWATER CALCULATED BASED ON THE 1990 DATA WERE ALSO QUITE HIGH WITH VALUES FOR THE MOST PROBABLE AND REALISTIC WORST CASE RISKS BOTH BEING APPROXIMATELY  $1.3 \times (10^{-1})$ . THE BULK OF THE RISKS FOR THE 1990 DATA WERE DUE TO EXPOSURE TO BENZIDINE AND 3,3'-DIMETHYLBENZIDINE, TWO COMPOUNDS WHICH WERE NOT ANALYZED FOR DURING THE 1988 STUDY. IT IS LIKELY THAT THESE COMPOUNDS WERE PRESENT IN THE 1988 GROUNDWATER SAMPLES ALSO, AND THAT THE RISKS CALCULATED USING THE 1988 DATA MAY SOMEWHAT UNDERESTIMATE THE SITE-ASSOCIATED RISK FOR THIS PATHWAY. THE CANCER RISK ASSOCIATED WITH INHALATION OF VOLATILE CONTAMINANTS DURING SHOWERING, AND WITH DERMAL CONTACT OF GROUNDWATER DURING WASHING ALSO WERE WITHIN OR ABOVE THE TARGET RISK RANGE, BASED ON BOTH THE 1988 AND 1990 DATA. RISKS DUE TO EXPOSURES BY THESE PATHWAYS ARE, HOWEVER, LOWER THAN THE CANCER RISKS ASSOCIATED WITH GROUNDWATER INGESTION. TRICHLOROETHENE CONTRIBUTED THE BULK OF CALCULATED INHALATION RISKS FROM SHOWERING, BASED ON THE 1990 DATA.

THE POTENTIAL FOR NON-CARCINOGENIC ADVERSE EFFECTS ASSOCIATED WITH CONSUMPTION OF GROUNDWATER FROM THE DOWNGRAIENT AREA IS ALSO QUITE HIGH. USING THE RESULTS OF THE 1988 SAMPLING, THE HAZARD INDICES FOR THE USE OF DOWNGRAIENT GROUNDWATER ARE APPROXIMATELY 5600 AND 220 FOR THE REALISTIC WORST CASE AND MOST PROBABLE CASE SCENARIOS, RESPECTIVELY. BASED ON THE 1990 DATA, THE CORRESPONDING HAZARD INDICES ARE APPROXIMATELY 1100 AND 56, RESPECTIVELY. IN BOTH DATA SETS, THE VAST MAJORITY OF THE HAZARD INDEX VALUE IS DUE TO PRESENCE OF NITROBENZENE, WHICH IS PRESENT AT CONCENTRATIONS UP TO 94 MG/L IN GROUNDWATER IN THE DOWNGRAIENT AREA. BOTH THE WORST CASE AND MOST PROBABLE HAZARD INDICES FOR INHALATION OF GROUNDWATER CONTAMINANTS WHILE SHOWERING FROM EITHER THE 1988 OR 1990 DATA ALSO EXCEEDED 1.0 FOR SEVERAL TARGET ENDPOINTS INDICATING A POTENTIAL FOR ADVERSE NON-CARCINOGENIC EFFECTS.

GROUNDWATER EXPOSURE COULD ALSO OCCUR AS A RESULT OF GROUNDWATER MIGRATING INTO RESIDENTIAL BASEMENTS IN THE DOWNGRAIENT AREA. RISKS WERE ESTIMATED FOR THIS PATHWAY USING CONTAMINANT CONCENTRATIONS DETECTED IN SHALLOW MONITORING WELLS DURING BOTH 1988 AND 1990 INVESTIGATIONS. THE CARCINOGENIC RISKS PREDICTED FOR BREATHING VOLATILIZED CONTAMINANTS FROM BASEMENT SEEPAGE CALCULATED FROM THE 1988 DATA WERE WITHIN USEPA'S TARGET RANGE FOR BOTH THE MOST PROBABLE AND THE REALISTIC WORST SCENARIOS ( $3.0 \times (10^{-5})$  AND  $1.2 \times (10^{-4})$  RESPECTIVELY). THE CARCINOGENIC RISKS DUE TO DERMAL CONTACT AND INGESTION OF SUMP WATER WERE ALSO WITHIN THE USEPA TARGET RANGE. NONE OF THE ORGAN SPECIFIC NON-CARCINOGENIC HAZARD INDICES PREDICTED FOR THE INHALATION OF VOLATILE CONTAMINANTS IN BASEMENT SUMPS EXCEEDED A HI=1.0 INDICATING THAT THE POTENTIAL FOR ADVERSE NONCARCINOGENIC EFFECTS IS UNLIKELY. THE HAZARD INDICES ASSOCIATED WITH DERMAL AND INGESTION EXPOSURE OF SUMP WATER WERE WELL BELOW 1.0.

THE RISKS PREDICTED FOR EXPOSURE TO BASEMENT SEEPAGE CALCULATED FROM THE 1990 DATA ARE SIMILAR ALTHOUGH SLIGHTLY LOWER IN MAGNITUDE TO THOSE CALCULATED FROM THE 1988 DATA. REALISTIC WORST CASE AND MOST PROBABLE CASE CANCER RISKS ASSOCIATED WITH THE INHALATION PATHWAY ARE BOTH WITHIN THE USEPA TARGET LIMITS ( $1.0 \times (10^{-4})$  AND  $2.4 \times (10^{-5})$ , RESPECTIVELY). RISKS ASSOCIATED WITH DERMAL CONTACT AND INGESTION EXPOSURES ARE  $3.4 \times (10^{-6})$  FOR THE WORST CASE SCENARIO AND  $6.7 \times (10^{-7})$  FOR THE MOST PROBABLE CASE SCENARIO. EXPOSURES TO GROUNDWATER CONTAMINANTS IN SEEPAGE BY BOTH ROUTES ARE ASSOCIATED WITH HAZARD INDICES WHICH APPROACH BUT DO NOT EXCEED 1.0.

FORMER VAULT AND HILL AREAS - CARCINOGENIC RISKS POSED BY THE INGESTION OF GROUNDWATER FROM BOTH OF THESE LOCATIONS WOULD GREATLY EXCEED THE USEPA TARGET CANCER RISK RANGE FOR BOTH THE MOST PROBABLE AND REALISTIC WORST CASE SCENARIOS. SIMILARLY, THE HAZARD INDEX POSED BY THE INGESTION OF GROUNDWATER FROM THESE AREAS NON-CARCINOGENIC ALSO EXCEEDED THE USEPA TARGET HAZARD INDEX OF 1.0.

## 2. SURFACE WATER RISK CHARACTERIZATION.

SURFACE WATER EXPOSURE WAS ASSESSED AT TROLLEY BROOK AND THE EASTERN WETLAND BASED A LIMITED NUMBER OF SAMPLES. THE CARCINOGENIC AND NON-CARCINOGENIC RISKS OF EXPOSURE THROUGH DERMAL CONTACT AND INGESTION WERE FOUND TO BE WITHIN OR BELOW ACCEPTABLE. A COMPREHENSIVE SAMPLING AND

RISK CHARACTERIZATION EFFORT OF THE SURFACE WATER AT THE SITE BEING COMPLETED AS PART OF OPERABLE UNIT 3.

### 3. SEDIMENT RISK CHARACTERIZATION.

SEDIMENT EXPOSURE WAS ASSESSED IN THE EASTERN WETLAND BASED ON A LIMITED NUMBER OF SAMPLES. NON-CARCINOGENIC RISKS WERE BELOW 1.0 INDICATING THAT THE POTENTIAL FOR ADVERSE NON-CARCINOGENIC HEALTH EFFECTS IS SMALL. CANCER RISKS ASSOCIATED WITH EXPOSURES TO EASTERN WETLAND SEDIMENTS WERE WITHIN EPA'S TARGET RISK RANGE, AT  $1.3 \times 10^{-5}$ . A COMPREHENSIVE SAMPLING AND RISK CHARACTERIZATION EFFORT OF THE SEDIMENTS AT THE SITE IS BEING COMPLETED AS PART OF OPERABLE UNIT 3.

### C. UNCERTAINTIES IN ESTIMATING RISK

IT SHOULD BE EMPHASIZED THAT THE RISK ESTIMATES IN THIS ASSESSMENT ARE BASED ON NUMEROUS ASSUMPTIONS, EACH HAVING UNCERTAINTY ASSOCIATED WITH IT. SEVERAL TYPES OF UNCERTAINTIES SHOULD BE CONSIDERED IN ANY RISK EVALUATION:

- UNCERTAINTIES ASSOCIATED WITH IDENTIFYING CONTAMINANTS OF CONCERN AND ESTIMATING EXPOSURE CONCENTRATIONS
- UNCERTAINTIES ASSOCIATED WITH ESTIMATING THE FREQUENCY, DURATION, AND MAGNITUDE OF EXPOSURE
- UNCERTAINTIES IN THE MODELS USED TO CHARACTERIZE RISKS
- UNCERTAINTIES IN ESTIMATING CARCINOGENIC POTENCY FACTORS AND/OR NON-CARCINOGENIC MEASURES OF TOXICITY (E.G., RFDS)

A COMPLETE DISCUSSION OF THESE UNCERTAINTIES IS LOCATED IN SECTION 6 OF THE RISK ASSESSMENT.

### D. ECOLOGICAL ASSESSMENT

AN ECOLOGICAL ASSESSMENT OF THE GROUNDWATER CONTAMINANTS EFFECT ON THE ENVIRONMENT WAS PERFORMED AS A COMPONENT OF THE RISK ASSESSMENT (SECTION 7) BASED ON A LIMITED NUMBER OF SURFACE WATER SAMPLING. FINAL ASSESSMENT OF THE SITE'S OVERALL EFFECT ON SURFACE WATER BODIES AND THEIR ASSOCIATED ECOSYSTEMS WILL BE PERFORMED AS PART OF THE OPERABLE UNIT 3 STUDIES NOW UNDER WAY.

### E. CONCLUSION

ACTUAL OR THREATENED RELEASES OF HAZARDOUS SUBSTANCES TO GROUNDWATER, IF NOT ADDRESSED BY IMPLEMENTING THE RESPONSE ACTION SELECTED IN THIS ROD, MAY PRESENT AN IMMINENT AND SUBSTANTIAL ENDANGERMENT TO PUBLIC HEALTH, WELFARE, OR THE ENVIRONMENT. RISKS DUE TO GROUNDWATER RELEASES ARE DEALT WITH IN THIS RECORD OF DECISION.

**#DSA**

## **VII. DEVELOPMENT AND SCREENING OF ALTERNATIVES**

### A. STATUTORY REQUIREMENTS/RESPONSE OBJECTIVES

UNDER ITS LEGAL AUTHORITIES, EPA'S PRIMARY RESPONSIBILITY AT SUPERFUND SITES IS TO UNDERTAKE REMEDIAL ACTIONS THAT ARE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT. IN ADDITION, SECTION 121 OF CERCLA ESTABLISHES SEVERAL OTHER STATUTORY REQUIREMENTS AND PREFERENCES, INCLUDING: A REQUIREMENT THAT EPA'S REMEDIAL ACTION, WHEN COMPLETE, MUST COMPLY WITH ALL FEDERAL AND MORE STRINGENT STATE ENVIRONMENTAL STANDARDS, REQUIREMENTS, CRITERIA OR LIMITATIONS, UNLESS A WAIVER IS INVOKED; A REQUIREMENT THAT EPA SELECT A REMEDIAL ACTION THAT IS COST-EFFECTIVE AND THAT UTILIZES PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES OR RESOURCE RECOVERY TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE; AND A PREFERENCE FOR REMEDIES IN WHICH TREATMENT WHICH PERMANENTLY AND SIGNIFICANTLY REDUCES THE VOLUME, TOXICITY OR MOBILITY OF THE HAZARDOUS



SUBSTANCES IS A PRINCIPAL ELEMENT OVER REMEDIES NOT INVOLVING SUCH TREATMENT. RESPONSE ALTERNATIVES WERE DEVELOPED TO BE CONSISTENT WITH THESE CONGRESSIONAL MANDATES.

BASED ON PRELIMINARY INFORMATION RELATING TO TYPES OF CONTAMINANTS, ENVIRONMENTAL MEDIA OF CONCERN, AND POTENTIAL EXPOSURE PATHWAYS, REMEDIAL ACTION OBJECTIVES WERE DEVELOPED IN THE FEASIBILITY STUDY TO AID IN THE DEVELOPMENT AND SCREENING OF ALTERNATIVES. THESE REMEDIAL ACTION OBJECTIVES WERE DEVELOPED TO MITIGATE EXISTING AND FUTURE POTENTIAL THREATS TO PUBLIC HEALTH AND THE ENVIRONMENT. THESE RESPONSE OBJECTIVES WERE:

1. REDUCE MIGRATION OF CONTAMINANTS IN GROUNDWATER.
2. REDUCE RISKS TO HUMAN HEALTH ASSOCIATED WITH POTENTIAL FUTURE CONSUMPTION AND DIRECT CONTACT WITH GROUNDWATER.
3. REDUCE RISKS FROM PRESENT AND POTENTIAL FUTURE INHALATION OF EVAPORATED GROUNDWATER CONTAMINANTS.
4. LIMIT DEGRADATION OF THE SUDBURY RIVER AND WETLANDS DUE TO THE NATURAL DISCHARGE OF CONTAMINATED GROUNDWATER.
5. COMPLY WITH STATE AND FEDERAL APPLICABLE, RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS), INCLUDING DRINKING WATER STANDARDS.

THESE OBJECTIVES WERE DEVELOPED FOR FINAL REMEDIAL ACTIONS. THE INTERIM ACTIONS DESCRIBED IN THE PROPOSED PLAN AND IN THIS RECORD OF DECISION ARE DESIGNED AS INTERIM STEPS TOWARD REACHING THESE OBJECTIVES.

#### B. TECHNOLOGY AND ALTERNATIVE DEVELOPMENT AND SCREENING

CERCLA AND THE NCP SET FORTH THE PROCESS BY WHICH REMEDIAL ACTIONS ARE EVALUATED AND SELECTED. IN ACCORDANCE WITH THESE REQUIREMENTS, A RANGE OF ALTERNATIVES WERE DEVELOPED FOR THE SITE.

THE RI/FS DEVELOPED ALTERNATIVES THAT INVOLVE LITTLE OR NO TREATMENT BUT PROVIDE PROTECTION THROUGH ENGINEERING OR INSTITUTIONAL CONTROLS. THE FOCUS OF OPERABLE UNIT 1 AND THE VAULT REMOVAL WAS ON SOURCE CONTROL, THEREFORE, THE EMPHASIS OF THIS ACTION IS CONCENTRATED ON MANAGEMENT OF MIGRATION.

WITH RESPECT TO GROUND WATER RESPONSE ACTION, THE RI/FS DEVELOPED A LIMITED NUMBER OF REMEDIAL ALTERNATIVES THAT ATTAIN SITE SPECIFIC REMEDIATION LEVELS WITHIN DIFFERENT TIME FRAMES USING DIFFERENT TECHNOLOGIES; AND A NO ACTION ALTERNATIVE.

AS DISCUSSED IN CHAPTER 4 OF THE FEASIBILITY STUDY, THE RI/FS IDENTIFIED, ASSESSED AND SCREENED TECHNOLOGIES BASED ON IMPLEMENTABILITY, EFFECTIVENESS, AND COST. THESE TECHNOLOGIES WERE COMBINED MANAGEMENT OF MIGRATION (MM) ALTERNATIVES. CHAPTER 5 OF THE FEASIBILITY STUDY PRESENTED THE REMEDIAL ALTERNATIVES DEVELOPED BY COMBINING THE TECHNOLOGIES IDENTIFIED IN THE PREVIOUS SCREENING PROCESS IN THE CATEGORIES IDENTIFIED IN SECTION 300.430(E)(3) OF THE NCP. THE PURPOSE OF THE INITIAL SCREENING WAS TO NARROW THE NUMBER OF POTENTIAL REMEDIAL ACTIONS FOR FURTHER DETAILED ANALYSIS WHILE PRESERVING A RANGE OF OPTIONS. EACH ALTERNATIVE WAS THEN EVALUATED AND SCREENED IN CHAPTER 6 OF THE FEASIBILITY STUDY.

IN SUMMARY, OF THE 1 LIMITED ACTION ALTERNATIVE AND THE 4 ACTIVE MANAGEMENT OF MIGRATION REMEDIAL ALTERNATIVES SCREENED IN CHAPTER 5, ALL 5 WERE RETAINED FOR DETAILED ANALYSIS. TABLE 7-1 IDENTIFIES THE ALTERNATIVES THAT WERE RETAINED THROUGH THE DETAILED ANALYSIS PROCESS.

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#### **VIII. DESCRIPTION OF ALTERNATIVES**

THE ALTERNATIVES DESCRIBED HERE ARE ALL INTERIM REMEDIES. THE REASONS FOR EPA'S DECISION TO UTILIZE AN INTERIM REMEDY ARE SPELLED OUT IN SECTION X OF THIS ROD.

THIS SECTION PROVIDES A NARRATIVE SUMMARY OF EACH ALTERNATIVE EVALUATED. MANAGEMENT OF MIGRATION ALTERNATIVES ADDRESS CONTAMINANTS THAT HAVE MIGRATED FROM THE ORIGINAL SOURCE OF CONTAMINATION. AT THE NYANZA CHEMICAL WASTE DUMP SITE, CONTAMINANTS HAVE MIGRATED FROM MEGUNKO HILL, THE VAULT, AND OTHER POSSIBLE SOURCE AREAS TOWARDS DOWNGRAIENT AREAS, AND AWAY FROM THE PRESUMED SOURCE AREAS.

THE ALTERNATIVES EVALUATED INCLUDE A MINIMAL ACTION ALTERNATIVE (RA-1) AS WELL AS A SERIES OF ALTERNATIVE MANAGEMENT OF MIGRATION COLLECTION SCHEMES (RA-2, RA-3, RA-4, RA-5). A "TRUE" NO-ACTION ALTERNATIVE WAS NOT INCLUDED BECAUSE IT WOULD NOT HAVE BEEN PROTECTIVE, AND THEREFORE WOULD NOT HAVE MET THE THRESHOLD CRITERIA OF THE CERCLA STATUTE.

THE INTERIM ALTERNATIVES DISCUSSED HERE ARE IDENTICAL TO THE LONG-TERM ALTERNATIVES DISCUSSED IN THE FS, EXCEPT THAT THEIR COMPARISON IS BASED ON A 5-YEAR OPERATIONAL PERIOD, RATHER THAN THE 30-YEAR TIME FRAME USED FOR COST PURPOSES IN THE FS. THE COST ESTIMATES ARE DOCUMENTED IN THE ADMINISTRATIVE RECORD.

EACH OF THESE ALTERNATIVES IS DESCRIBED BRIEFLY BELOW, ALONG WITH A DISCUSSION OF HOW EACH WOULD FUNCTION AS AN INTERIM REMEDY. A MORE DETAILED DESCRIPTION OF EACH ALTERNATIVE CAN BE FOUND IN SECTION 6 OF THE FS REPORT.

ALTERNATIVE RA-1: MINIMAL/NO ACTION: THE FS EVALUATED THIS ALTERNATIVE IN DETAIL TO SERVE AS A BASELINE FOR COMPARISON WITH OTHER REMEDIAL ALTERNATIVES UNDER CONSIDERATION. UNDER THIS ALTERNATIVE, NO TREATMENT OR CONTAINMENT OF GROUNDWATER CONTAMINATION WOULD OCCUR. THE OBJECTIVES OF THIS ALTERNATIVE ARE TO RESTRICT PUBLIC ACCESS AND POTENTIAL EXPOSURE TO SITE CONTAMINATION, PROHIBIT USE OF CONTAMINATED GROUNDWATER, AND EVALUATE SITE CONDITIONS AND CONTAMINANT MIGRATION PERIODICALLY DURING THE INTERIM PERIOD. THESE OBJECTIVES WOULD BE ACCOMPLISHED USING SITE ACCESS CONTROL MEASURES AND INSTITUTIONAL CONTROLS TO LIMIT EXPOSURE TO CONTAMINANTS AND INSTALLATION OF WELLS AND LONG-TERM ENVIRONMENTAL MONITORING. FENCING AND SIGNS WOULD BE READILY INSTALLED BY VENDORS IN THE AREA. ENVIRONMENTAL MONITORING WOULD ALSO BE CONDUCTED EASILY BY SEVERAL VENDORS. INSTITUTIONAL CONTROLS IN THE FORM OF DEED AND WELL PERMIT RESTRICTIONS MAY REQUIRE COOPERATION FROM LOCAL AND STATE AUTHORITIES.

ESTIMATED TIME FOR DESIGN AND CONSTRUCTION:	ONE YEAR
ESTIMATED TIME OF OPERATION, INTERIM ALTERNATIVE:	5 YEARS
ESTIMATED CAPITAL COST:	\$320,000
ESTIMATED OPERATION AND MAINTENANCE COSTS (5 YEARS, PRESENT WORTH):	\$721,000
ESTIMATED TOTAL COST (PRESENT WORTH):	\$1,041,000

ALTERNATIVE RA-2: MANAGEMENT OF MIGRATION WITH EXTRACTION AT THE NORTHERN BOUNDARY OF THE SITE; TREATMENT OF COLLECTED GROUNDWATER; DISCHARGE OF EFFLUENT TO THE SUDBURY RIVER: THIS ALTERNATIVE IS THE SELECTED ALTERNATIVE AND IS DISCUSSED IN SECTION X, ENTITLED "THE SELECTED REMEDY".

ALTERNATIVE RA-3: MANAGEMENT OF MIGRATION WITH EXTRACTION TO THE NORTH AND NORTH-EAST OF THE SITE; TREATMENT OF COLLECTED GROUNDWATER; DISCHARGE OF EFFLUENT TO THE SUDBURY RIVER: THIS REMEDIAL ALTERNATIVE INVOLVES CONTAMINATED GROUNDWATER EXTRACTION IN THE PORTION OF THE PLUME TO THE NORTH AND NORTH-EAST OF THE SITE; TREATMENT OF THE GROUNDWATER; AND DISCHARGE OF TREATED GROUNDWATER INTO THE SUDBURY RIVER. THE TREATMENT PROCESS IS THE SAME ONE AS IS DESCRIBED UNDER EPA'S SELECTED ALTERNATIVE. THIS ALTERNATIVE ALSO INCLUDES THE SITE CONTROL FEATURES DESCRIBED FOR RA-1. THE OBJECTIVE OF THIS ALTERNATIVE IS TO PREVENT THE CONTAMINANTS FROM EXPANDING BEYOND CURRENT LIMITS OF THE PLUME AND THEREBY PREVENT THE DISCHARGE OF CONTAMINANTS TO THE SUDBURY RIVER. UNLIKE RA-2, THIS ALTERNATIVE WOULD NOT DIRECTLY REMEDIATE THE SOURCE AREA OF THE CONTAMINATED GROUNDWATER, THUS ALLOWING POTENTIALLY HIGH LEVELS OF CONTAMINATION TO MIGRATE BY NATURAL PROCESSES TO THE EXTRACTION WELLS TO THE NORTH AND NORTH-EAST OF THE SITE BEFORE BEING REMOVED FROM THE AQUIFER.

AS AN INTERIM REMEDY, THIS ALTERNATIVE WOULD PERMIT THE COLLECTION OF SOME OPERATIONAL DATA, BUT IT WOULD ALSO ALLOW THE CONTINUED MIGRATION OF GROUNDWATER CONTAMINANTS FROM THE SITE.

ESTIMATED TIME FOR DESIGN AND CONSTRUCTION:	3 YEARS
ESTIMATED TIME OF OPERATION, INTERIM ALTERNATIVE:	5 YEARS ESTIMATED

CAPITAL COST:	\$3,870,000
ESTIMATED OPERATION AND MAINTENANCE COSTS (5 YEARS, PRESENT WORTH):	\$1,820,000
ESTIMATED TOTAL COST (PRESENT WORTH):	\$5,690,000

ALTERNATIVE RA-4: MANAGEMENT OF MIGRATION WITH EXTRACTION BOTH AT THE NORTHERN BOUNDARY OF THE SITE AND TO THE NORTH-EAST OF THE SITE; TREATMENT OF THE COLLECTED GROUNDWATER; DISCHARGE OF EFFLUENT TO THE SUDBURY RIVER: THIS ALTERNATIVE EXTRACTS HIGHLY CONTAMINATED SOURCE AREA GROUNDWATER BY COMBINING THE EXTRACTION COMPONENTS OF THE SELECTED ALTERNATIVE RA-2 WITH THOSE OF ALTERNATIVE RA-3. THE COLLECTED GROUNDWATER WOULD UNDERGO TREATMENT TO REMOVE CONTAMINANTS AS DESCRIBED IN THE SELECTED ALTERNATIVE RA-2. FOLLOWING TREATMENT, THE WATER WOULD BE DISCHARGED TO THE SUDBURY RIVER. THIS ALTERNATIVE WOULD INCLUDE THE SITE CONTROL FEATURES DESCRIBED FOR ALTERNATIVE RA-1. THE OBJECTIVE OF THIS ALTERNATIVE IS TO PREVENT THE CONTAMINATED GROUNDWATER FROM EXPANDING BEYOND ITS CURRENT BOUNDARIES AND ULTIMATELY INTO THE SUDBURY RIVER. THIS ALTERNATIVE WOULD ALSO EXTRACT THE MOST HIGHLY CONTAMINATED GROUNDWATER TO PREVENT INCREASES IN CONTAMINATION TO THE NORTH AND EAST OF THE SITE. RA-4 WOULD REQUIRE MUCH MORE DISRUPTION TO THE COMMUNITY SURROUNDING THE SITE THAN THE SELECTED ALTERNATIVE, WHILE CAPTURING CONTAMINANTS OVER A LARGER AREA.

AS AN INTERIM REMEDY, THIS ALTERNATIVE WOULD PERMIT THE COLLECTION OF OPERATIONAL DATA, WHILE REDUCING THE MIGRATION OF CONTAMINANTS THROUGHOUT THE PLUME.

ESTIMATED TIME FOR DESIGN AND CONSTRUCTION:	3 YEARS
ESTIMATED TIME OF OPERATION, INTERIM ALTERNATIVE:	5 YEARS
CAPITAL COST:	\$6,050,000
ESTIMATED OPERATION AND MAINTENANCE COSTS (5 YEARS, PRESENT WORTH):	\$3,140,000
ESTIMATED TOTAL COST (PRESENT WORTH):	\$9,190,000

ALTERNATIVE RA-5: ACTIVE PLUME-WIDE EXTRACTION; TREATMENT OF THE COLLECTED GROUNDWATER; DISCHARGE OF EFFLUENT TO THE SUDBURY RIVER:

THIS ALTERNATIVE IS A COMPREHENSIVE PLUME-WIDE ALTERNATIVE THAT DIFFERS FROM THE OTHERS BECAUSE IT INVOLVES EXTRACTION OF CONTAMINATED WATER AT MANY LOCATIONS THROUGHOUT THE PLUME. IT ALSO INCLUDES GROUNDWATER TREATMENT AS DESCRIBED FOR THE SELECTED ALTERNATIVE RA-2, FOLLOWED BY DISCHARGE OF THE TREATED WATER INTO THE SUDBURY RIVER. ALTERNATIVE RA-5 WOULD ALSO INCLUDE THE SITE CONTROL FEATURES DESCRIBED FOR ALTERNATIVE RA-1. THIS ALTERNATIVE WOULD USE NUMEROUS EXTRACTION WELLS TO MINIMIZE THE TRANSPORT OF CONTAMINATION THROUGH THE AQUIFER AND TO MINIMIZE THE TIME FRAME REQUIRED TO COMPLETE TREATMENT OF THE AQUIFER; AND WOULD PREVENT MIGRATION AND DISCHARGE OF CONTAMINATED GROUNDWATER INTO THE SUDBURY RIVER. UNIFORMLY DISTRIBUTED EXTRACTION WELLS WOULD PREVENT HIGHLY CONTAMINATED GROUNDWATER FROM MIGRATING TO AREAS OF LOWER CONCENTRATIONS.

AS AN INTERIM REMEDY, THIS ALTERNATIVE WOULD PERMIT THE COLLECTION OF OPERATIONAL DATA, WHILE REDUCING THE MIGRATION OF CONTAMINANTS THROUGHOUT THE PLUME.

ESTIMATED TIME FOR DESIGN AND CONSTRUCTION:	3 YEARS
ESTIMATED TIME OF OPERATION, INTERIM ALTERNATIVE:	5 YEARS
ESTIMATED CAPITAL COST:	\$6,650,000
ESTIMATED OPERATION AND MAINTENANCE COSTS (PRESENT WORTH, 5 YEARS):	\$3,430,000
ESTIMATED TOTAL COST (PRESENT WORTH):	\$10,080,000

## #SCAA

### IX. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

SECTION 121(B) (1) OF CERCLA PRESENTS SEVERAL FACTORS THAT AT A MINIMUM EPA IS REQUIRED TO CONSIDER IN ITS ASSESSMENT OF ALTERNATIVES. BUILDING UPON THESE SPECIFIC STATUTORY MANDATES, THE NATIONAL CONTINGENCY PLAN ARTICULATES NINE EVALUATION CRITERIA TO BE USED IN ASSESSING THE

## INDIVIDUAL REMEDIAL ALTERNATIVES.

A DETAILED ANALYSIS WAS PERFORMED ON THE ALTERNATIVES AS FINAL REMEDIES USING THE NINE EVALUATION CRITERIA IN ORDER TO SELECT A REMEDY AND CAN BE FOUND IN THE FS AT PAGES 6-10 THROUGH 6-82. THE FOLLOWING IS A SUMMARY OF THE COMPARISON OF EACH ALTERNATIVES STRENGTH AND WEAKNESS WITH RESPECT TO THE NINE EVALUATION CRITERIA. THESE CRITERIA AND THEIR DEFINITIONS ARE:

### THRESHOLD CRITERIA

THE TWO THRESHOLD CRITERIA DESCRIBED BELOW MUST BE MET IN ORDER FOR THE ALTERNATIVES TO BE ELIGIBLE FOR SELECTION IN ACCORDANCE WITH THE NCP.

1. OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT ADDRESSES WHETHER OR NOT A REMEDY PROVIDES ADEQUATE PROTECTION AND DESCRIBES HOW RISKS POSED THROUGH EACH PATHWAY ARE ELIMINATED, REDUCED OR CONTROLLED THROUGH TREATMENT, ENGINEERING CONTROLS, OR INSTITUTIONAL CONTROLS.
2. COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) ADDRESSES WHETHER OR NOT A REMEDY WILL MEET ALL OF THE ARARS OF OTHER FEDERAL AND STATE ENVIRONMENTAL LAWS AND/OR PROVIDE GROUNDS FOR INVOKING A WAIVER.

### PRIMARY BALANCING CRITERIA

THE FOLLOWING FIVE CRITERIA ARE UTILIZED TO COMPARE AND EVALUATE THE ELEMENTS OF ONE ALTERNATIVE TO ANOTHER THAT MEET THE THRESHOLD CRITERIA.

3. LONG-TERM EFFECTIVENESS AND PERMANENCE ADDRESSES THE CRITERIA THAT ARE UTILIZED TO ASSESS ALTERNATIVES FOR THE LONG-TERM EFFECTIVENESS AND PERMANENCE THEY AFFORD, ALONG WITH THE DEGREE OF CERTAINTY THAT THEY WILL PROVE SUCCESSFUL.
4. REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT ADDRESSES THE DEGREE TO WHICH ALTERNATIVES EMPLOY RECYCLING OR TREATMENT THAT REDUCES TOXICITY, MOBILITY, OR VOLUME, INCLUDING HOW TREATMENT IS USED TO ADDRESS THE PRINCIPAL THREATS POSED BY THE SITE.
5. SHORT TERM EFFECTIVENESS ADDRESSES THE PERIOD OF TIME NEEDED TO ACHIEVE PROTECTION AND ANY ADVERSE IMPACTS ON HUMAN HEALTH AND THE ENVIRONMENT THAT MAY BE POSED DURING THE CONSTRUCTION AND IMPLEMENTATION PERIOD, UNTIL CLEANUP GOALS ARE ACHIEVED.
6. IMPLEMENTABILITY ADDRESSES THE TECHNICAL AND ADMINISTRATIVE FEASIBILITY OF A REMEDY, INCLUDING THE AVAILABILITY OF MATERIALS AND SERVICES NEEDED TO IMPLEMENT A PARTICULAR OPTION.
7. COST INCLUDES ESTIMATED CAPITAL AND OPERATION MAINTENANCE (O&M) COSTS, AS WELL AS PRESENT-WORTH COSTS.

### MODIFYING CRITERIA

THE MODIFYING CRITERIA ARE USED ON THE FINAL EVALUATION OF REMEDIAL ALTERNATIVES GENERALLY AFTER EPA HAS RECEIVED PUBLIC COMMENT ON THE RI/FS AND PROPOSED PLAN.

8. STATE ACCEPTANCE ADDRESSES THE STATE'S POSITION AND KEY CONCERNS RELATED TO THE PREFERRED ALTERNATIVE AND OTHER ALTERNATIVES, AND THE STATE'S COMMENTS ON ARARS OR THE PROPOSED USE OF WAIVERS.
9. COMMUNITY ACCEPTANCE ADDRESSES THE PUBLICS GENERAL RESPONSE TO THE ALTERNATIVES DESCRIBED IN THE PROPOSED PLAN AND RI/FS REPORT.

FOLLOWING THE DETAILED ANALYSIS OF EACH INDIVIDUAL ALTERNATIVE, A COMPARATIVE ANALYSIS, FOCUSING ON THE RELATIVE PERFORMANCE OF EACH ALTERNATIVE AS A FINAL REMEDY AGAINST THE NINE CRITERIA, WAS CONDUCTED. THIS COMPARATIVE ANALYSIS CAN BE FOUND IN SECTION VI OF THE FEASIBILITY STUDY.

THE SECTION BELOW PRESENTS THE NINE CRITERIA AND A BRIEF NARRATIVE SUMMARY OF THE ALTERNATIVES AS INTERIM REMEDIES AND THEIR STRENGTHS AND WEAKNESSES ACCORDING TO THE DETAILED AND COMPARATIVE ANALYSIS.

1. OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT:

EACH OF THE ALTERNATIVES, VIEWED AS FIVE-YEAR INTERIM MEASURES, WOULD REDUCE THE OVERALL RISK TO HUMAN HEALTH AND THE ENVIRONMENT TO VARYING DEGREES. OVER A FIVE-YEAR PERIOD, ALTERNATIVE RA-1 WOULD PROVIDE THE LEAST PROTECTION DUE TO UNCONTROLLED MIGRATION OF EXISTING CONTAMINATION AND CONTINUED CONTAMINATED DISCHARGES INTO THE SUDBURY RIVER. OVER A FIVE-YEAR PERIOD, ALTERNATIVES RA-2, RA-4 AND RA-5 WOULD LIMIT THE MIGRATION OF HIGHLY CONTAMINATED GROUNDWATER FROM THE SITE TO AREAS TO THE NORTH AND EAST, THEREBY PREVENTING AN INCREASE IN CURRENT POTENTIAL RISKS IN THE PORTION OF THE PLUME TO THE NORTH AND EAST OF THE SITE. ALTERNATIVES RA-2 THROUGH RA-5 WOULD ALSO PREVENT DISCHARGE OF CONTAMINATED GROUNDWATER TO THE RIVER TO SOME EXTENT. OVER A FIVE-YEAR PERIOD, ALTERNATIVE RA-5 WOULD PROVIDE THE MOST EFFECTIVE REMOVAL OF CONTAMINANTS, BECAUSE WELLS WOULD BE PLACED AT MANY LOCATIONS THROUGHOUT THE STUDY AREA. ALTERNATIVE RA-3 WOULD BE THE LEAST EFFECTIVE OF THE ACTIVE ALTERNATIVES (RA-2, RA-3, RA-4, AND RA-5) BECAUSE THE LARGE MASS OF CONTAMINATION FOUND ON-SITE WOULD HAVE TO MIGRATE TO THE PLUME MANAGEMENT WELLS TO THE NORTH AND NORTH-EAST OF THE SITE BEFORE COLLECTION. ALTERNATIVE RA-2 WOULD REMOVE A SIGNIFICANT AMOUNT OF CONTAMINANTS, SINCE IT DEALS DIRECTLY WITH THE AREAS WHERE THE HIGHEST CONCENTRATIONS OF GROUNDWATER CONTAMINANTS HAVE BEEN FOUND AND WILL DRAW CONTAMINANTS FROM A LARGE PERCENTAGE OF THE KNOWN PLUME AREA.

EACH OF ALTERNATIVES RA-2, RA-4, AND RA-5, WHEN VIEWED AS INTERIM REMEDIES, WOULD PROVIDE SIMILAR INFORMATION LEADING TO THE CHOICE OF A FINAL REMEDY. ALTERNATIVE RA-3 WOULD PROVIDE LESS INFORMATION, SINCE IT WOULD NOT BE DRAWING GROUNDWATER FROM THE MOST CONTAMINATED AREA NEAR THE VAULT.

2. COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS):

WHEN COMPARING INTERIM REMEDIES, IT IS APPROPRIATE TO ANALYZE COMPLIANCE ONLY WITH THOSE LAWS AND REGULATIONS THAT ARE APPLICABLE OR RELEVANT AND APPROPRIATE TO THE LIMITED SCOPE OF THE INTERIM ACTION. FOR ALL GROUNDWATER THAT THEY WOULD EXTRACT AND TREAT, ALTERNATIVES RA-2 THROUGH RA-5 WOULD MEET THE SAME ARARS FOR THE DISCHARGE OF THE TREATED GROUNDWATER INTO THE SUDBURY RIVER, THE DISCHARGE OF AIR, AND THE DISPOSAL OF SLUDGES RESULTING FROM THE TREATMENT PROCESS. IN ADDITION ALL LOCATION SPECIFIC ARARS WILL BE MET. THESE ARARS WOULD BE MET DURING THE INTERIM REMEDIAL PERIOD.

3. LONG-TERM EFFECTIVENESS AND PERMANENCE:

LONG-TERM EFFECTIVENESS AND PERMANENCE IS NOT RELEVANT TO THE COMPARISON AMONG INTERIM MEASURES. THE LONG-TERM EFFECTIVENESS AND PERMANENCE OF ACTIONS WILL BE CONSIDERED IN A FINAL ROD, BASED IN LARGE PART ON THE DATA COLLECTED DURING THE INTERIM REMEDIAL PERIOD OF 5 YEARS.

4. REDUCTION OF TOXICITY, MOBILITY OR VOLUME THROUGH TREATMENT:

ALTERNATIVE RA-1 PROVIDES NO REDUCTION IN TOXICITY, MOBILITY, OR VOLUME OF THE CONTAMINANTS IN THE PLUME EXCEPT THROUGH NATURAL PROCESSES. AS INTERIM MEASURES, ALTERNATIVES RA-2 THROUGH RA-5 ALL REDUCE THE TOXICITY, MOBILITY, AND VOLUME OF ORGANIC CONTAMINANTS THROUGH GROUNDWATER EXTRACTION AND TREATMENT. ALTERNATIVE RA-2 REDUCES THE TOXICITY, MOBILITY, AND VOLUME OF ORGANIC COMPOUNDS LESS THAN ALTERNATIVES RA-4, AND RA-5, BECAUSE IT TREATS A SMALLER PORTION OF THE ENTIRE PLUME. HOWEVER, RA-2 IS SUPERIOR TO RA-3 WITH REGARD TO TOXICITY, MOBILITY, AND VOLUME SINCE IT ATTEMPTS TO CAPTURE CONTAMINANTS CLOSER TO THEIR SOURCE.

5. SHORT-TERM EFFECTIVENESS:

ALTERNATIVE RA-1 WOULD POSE THE LEAST SHORT-TERM RISK OF ADVERSE IMPACTS ON HUMAN HEALTH AND THE ENVIRONMENT, BECAUSE IT DOES NOT INCLUDE ANY DISTURBANCE OF CONTAMINATED AREAS.

THE SHORT-TERM RISKS FROM ALTERNATIVES RA-2 THROUGH RA-5 CONSIST OF THE POSSIBILITY OF AIRBORNE DUST EMISSIONS AND VOLATILIZATION OF CONTAMINANTS DURING CONSTRUCTION AND OPERATION OF THE

GROUNDWATER EXTRACTION AND TREATMENT SYSTEMS. SPECIAL ENGINEERING PRECAUTIONS, HOWEVER, INCLUDING AIR MONITORING AND CONTINGENCY PLANNING, WOULD MINIMIZE THESE RISKS AND PROTECT WORKERS AND AREA RESIDENTS. THERE IS A VERY SMALL CHANCE THAT RESIDENTS COULD BE EXPOSED TO COLLECTED GROUNDWATER THROUGH LEAKAGE IN THE COLLECTION NETWORK WHICH WOULD BE EXTENDED THROUGHOUT THE NEIGHBORHOOD UNDER RA-3, RA-4, AND RA-5. ALTERNATIVE RA-2, WHICH WOULD BE CONSTRUCTED PRIMARILY IN AN AREA ZONED AS INDUSTRIAL, WOULD POSE THE LEAST POTENTIAL RISK TO AREA RESIDENTS DURING CONSTRUCTION AND OPERATION OF THE EXTRACTION/TREATMENT SYSTEM. ALTERNATIVE RA-5 WOULD POSE THE GREATEST RISK, BECAUSE OF THE NUMEROUS EXTRACTION WELLS THAT WOULD BE LOCATED IN RESIDENTIAL AREAS.

#### 6. IMPLEMENTABILITY:

ALTERNATIVE RA-1 WOULD BE THE MOST EASILY IMPLEMENTED, SINCE IT REQUIRES NO CONSTRUCTION AND WOULD REQUIRE MINIMAL ADMINISTRATIVE APPROVALS, OTHER THAN THOSE RELATING TO INSTITUTIONAL CONTROLS. THE INSTITUTIONAL CONTROL MEASURES, AS WELL AS PUBLIC EDUCATION MEASURES ARE COMMON TO ALL FIVE ALTERNATIVES UNDER CONSIDERATION, AND THEREFORE PROVIDE NO BASIS TO DIFFERENTIATE THE ALTERNATIVES IN TERMS OF IMPLEMENTABILITY. THE VARIOUS COMPONENTS OF ALTERNATIVES RA-2 THROUGH RA-5 ARE COMMON ELEMENTS OF REMEDIAL PROJECTS THAT COULD BE READILY IMPLEMENTED. EACH WOULD INVOLVE SOME COORDINATION WITH LOCAL AGENCIES, WHICH MIGHT INCLUDE MEETING WITH TOWN BOARDS AND DEPARTMENT TO APPRIIZE THEM OF PLANNING AND CONSTRUCTION ACTIVITIES. ALTERNATIVES RA-3, RA-4, AND RA-5 WOULD REQUIRE THE GREATEST DEGREE OF COORDINATION WITH LOCAL AGENCIES, AS A RESULT OF THE LARGER AREA THAT WOULD BE AFFECTED BY THESE ALTERNATIVES.

ALL THE ACTIVE ALTERNATIVES WOULD CAUSE SOME LEVELS OF INTERFERENCES WITH SERVICES, UTILITIES, AND EXISTING STRUCTURES. THE EXTRACTION AND PIPING SYSTEMS FOR ALTERNATIVES RA-3, RA-4, AND RA-5 WOULD BE LOCATED IN RESIDENTIAL AND MIXED USE AREAS AND WOULD HAVE A GREATER IMPACT ON RESIDENTIAL AND COMMERCIAL ACTIVITIES THAN WOULD RA-2. RA-2, WITH ITS FOCUS PRIMARILY IN AN INDUSTRIAL AREA, WOULD CAUSE THE LEAST SUCH DISRUPTION. CONSTRUCTION ACTIVITIES ASSOCIATED WITH ALTERNATIVE RA-5 WOULD CAUSE THE GREATEST SUCH DISRUPTION BECAUSE OF ITS MANY EXTRACTION LOCATIONS.

#### 7. COST:

THE CAPITAL, OPERATION AND MAINTENANCE, AND TOTAL COST FOR EACH ALTERNATIVE FOR THE 5-YEAR INTERIM PERIOD IS PROVIDED AS PART OF THE PRECEDING "DESCRIPTION OF ALTERNATIVES" SECTION.

CONSTRUCTION AND OPERATION OF THE SELECTED ALTERNATIVE WILL PROVIDE DATA ON COSTS THAT CAN BE USED TO ASSESS THE COSTS OF THE ALTERNATIVES CONSIDERED IN THE FINAL ROD FOR THIS OPERABLE UNIT.

#### 8. STATE ACCEPTANCE:

THE COMMONWEALTH OF MASSACHUSETTS HAS INDICATED ITS CONCURRENCE WITH THE SELECTED REMEDY VIA ITS CONCURRENCE LETTER (APPENDIX II).

#### 9. COMMUNITY ACCEPTANCE:

BASED ON THE WRITTEN AND ORAL COMMENTS RECEIVED DURING THE RECENT COMMENT PERIOD, THERE IS GENERAL ACCEPTANCE OF THE SELECTED REMEDY, ALTHOUGH SOME COMMENTERS REQUESTED A LARGER SCALE REMEDY. RESPONSE TO COMMUNITY COMMENTS ARE LOCATED IN APPENDIX I.

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#### **X. THE SELECTED REMEDY**

EPA HAS CHOSEN RA-2 AS THE SELECTED ALTERNATIVE. RA-2 IS AN INTERIM REMEDY WHOSE GOALS ARE TO MANAGE THE MIGRATION OF CONTAMINANTS, TO TREAT THE HIGHEST LEVELS OF GROUNDWATER CONTAMINATION IN THE PLUME, AND TO COLLECT OPERATIONAL GROUNDWATER CLEANUP DATA. BASED ON THE INFORMATION COLLECTED DURING OPERATION OF THE INTERIM REMEDY, EPA WILL THEN PREPARE A FINAL ROD, WHICH WILL SPECIFY THE ULTIMATE GOALS, REMEDY AND THE ANTICIPATED TIME FRAME FOR REMEDIATION. THE FINAL

ROD WILL ALSO INCLUDE THE GROUNDWATER TARGET CLEANUP LEVELS OR, IF THE EVIDENCE INDICATES THAT IT IS IMPRACTICABLE TO ACHIEVE ALL SUCH TARGET CLEANUP LEVELS, WAIVERS OF ARARS.

EPA'S SELECTION OF THIS INTERIM REMEDY IS CONSISTENT WITH CURRENT EPA GUIDANCE FOR GROUNDWATER REMEDIATION AT SUPERFUND SITES, THE REQUIREMENTS OF CERCLA, AND TO THE EXTENT PRACTICABLE, THE NATIONAL CONTINGENCY PLAN. SPECIFICALLY, EVALUATION OF CURRENTLY OPERATING GROUNDWATER REMEDIES AT OTHER SUPERFUND SITES HAS SHOWN THAT EXTRACTION SYSTEMS ARE EFFECTIVE IN CONTAINING PLUMES, THUS PREVENTING FURTHER MIGRATION OF CONTAMINANTS, AND IN ACHIEVING SIGNIFICANT MASS REMOVAL OF CONTAMINANTS FROM GROUNDWATER. MANY FACTORS, INCLUDING THE HYDRO GEOLOGIC CHARACTERISTICS OF THE AQUIFER AND THE PHYSICAL AND CHEMICAL PROPERTIES OF THE CONTAMINANTS, MAY LIMIT THE EFFECTIVENESS OF THE SELECTED REMEDY TO REACH DRINKING WATER STANDARDS. THIS WILL BE EVALUATED DURING THE INTERIM REMEDY'S OPERATIONAL PERIOD.

BASED ON THESE FINDINGS, THE EPA OFFICE OF SOLID WASTE AND EMERGENCY RESPONSE HAS RECOMMENDED THE FOLLOWING APPROACHES TO DEVELOPING AND IMPLEMENTING GROUNDWATER RESPONSE ACTIONS AT SUPERFUND SITES: 1) INITIATION OF AN EARLY RESPONSE ACTION TO REDUCE FURTHER MIGRATION OF CONTAMINANTS; 2) INCORPORATION OF FLEXIBILITY IN THE SELECTED ALTERNATIVE TO ALLOW FOR CHANGES IN THE REMEDY; AND 3) COLLECTION OF DATA TO BETTER ASSESS THE MOVEMENT OF CONTAMINATION AND THE EFFECTIVENESS OF THE EXTRACTION SYSTEM. EPA HAS FOLLOWED THESE RECOMMENDATIONS IN DEVELOPING THE SELECTED INTERIM REMEDY FOR OPERABLE UNIT II.

EPA'S SELECTED ALTERNATIVE (RA-2) WILL ALLOW FOR REMEDIATION OF THE MOST HIGHLY CONTAMINATED AREAS OF THE GROUNDWATER, IMMEDIATELY REDUCING POTENTIAL RISKS IN THIS AREA AND PREVENTING MIGRATION INTO LESS CONTAMINATED AREAS. THE ALTERNATIVE WILL ALSO PROVIDE SOME PROTECTION TO THE SUDBURY RIVER BY LIMITING DISCHARGE OF CONTAMINATED GROUNDWATER TO THE RIVER NORTH OF THE SITE. (THE FULL IMPACT OF GROUNDWATER DISCHARGE ON THE RIVER IS ONE OF THE SUBJECTS OF OPERABLE UNIT III, AND IS NOT WITHIN THE SCOPE OF OPERABLE UNIT II). THE SELECTED ALTERNATIVE IS MORE PROTECTIVE AND WOULD PROVIDE MORE REDUCTION OF TOXICITY, MOBILITY OR VOLUME OF THE CONTAMINATION THAN THE NO-ACTION ALTERNATIVE, RA-1. FINALLY, BECAUSE IT ANTICIPATES THAT EXTRACTION AND TREATMENT WILL TAKE PLACE PRIMARILY IN AN INDUSTRIAL AREA, THE SELECTED ALTERNATIVE WILL CAUSE THE LEAST DISRUPTION TO RESIDENTIAL AREAS IN COMPARISON TO ALTERNATIVES RA-3, RA-4 AND RA-5.

IN THE PORTION OF THE STUDY AREA TO THE NORTH AND EAST OF THE SITE, INSTITUTIONAL CONTROLS WILL PROVIDE PROTECTION FROM EXPOSURE TO CONTAMINANTS THAT WOULD NOT BE REMEDIATED AS PART OF THE INTERIM REMEDY. LEVELS OF CONTAMINATION IN THIS AREA ARE EXPECTED TO BE REDUCED GRADUALLY OVER TIME AS THE HIGHLY CONTAMINATED PORTION OF THE PLUME IS REMEDIATED. WELLS AT THE EASTERN AND SOUTHERN BOUNDARY OF THE PLUME WILL BE MONITORED TO ASSESS ANY FURTHER MIGRATION OF CONTAMINANTS. THE FINAL ROD WILL ADDRESS THE POTENTIAL NEED FOR GROUNDWATER REMEDIATION IN THE PLUME TO THE EAST OF THE SITE.

IN SUMMARY, THE SELECTED ALTERNATIVE WILL BEST SERVE THE PURPOSES OF AN INTERIM REMEDY BY REDUCING FURTHER MIGRATION OF CONTAMINANTS, PROVIDING FLEXIBILITY, AND ALLOWING THE COLLECTION OF DATA TO TEST THE EFFECTIVENESS OF THE EXTRACTION SYSTEM. AT THE SAME TIME, THE SELECTED ALTERNATIVE WOULD ACHIEVE THE BEST BALANCE AMONG CRITERIA USED BY EPA TO EVALUATE THE ALTERNATIVES. THE SELECTED ALTERNATIVE IS MORE COST-EFFECTIVE AND READILY IMPLEMENTABLE THAN THE OTHER ALTERNATIVES, HAS FEWER SHORT-TERM EFFECTS, AND ACHIEVES ALL ARARS APPLICABLE TO ITS LIMITED SCOPE.

#### A. CLEANUP LEVELS

AS AN INTERIM STEP TO MEETING THE REMEDIAL RESPONSE OBJECTIVES OUTLINED IN SECTION VII., THE SELECTED REMEDY WILL EXTRACT AND TREAT GROUNDWATER FROM THE NORTHERN BORDER OF THE SITE, INCLUDING THE MOST HIGHLY CONTAMINATED PORTION OF THE PLUME. THE FS INDICATES THAT THE TIME REQUIRED TO ATTAIN DRINKING WATER STANDARDS IN GROUNDWATER COULD RANGE FROM DECADES TO CENTURIES, EVEN USING THE ALTERNATIVE EMPLOYING THE MOST EXTRACTION WELLS. BECAUSE OF THE UNCERTAINTY AS TO WHEN AND WHETHER ACTIVE REMEDIATION WILL ACHIEVE GROUNDWATER-QUALITY ARARS, EPA HAS SELECTED A FIVE-YEAR INTERIM REMEDY. DURING OPERATION OF THE 5-YEAR INTERIM REMEDY, EPA WILL ASSESS THE PERFORMANCE OF THE REMEDY IN ACHIEVING PROGRESS TOWARD THE CLEANUP OBJECTIVES. BASED ON THIS ASSESSMENT, EPA WILL ISSUE A FINAL ROD, IDENTIFYING THE TARGET GROUNDWATER CLEANUP LEVELS THAT WILL COMPLY WITH ARARS AND EVALUATE WHETHER A REMEDY CAPABLE OF ATTAINING THOSE CLEANUP LEVELS COULD BE IMPLEMENTED. THUS, EPA WILL NOT IDENTIFY THE TARGET GROUNDWATER CLEANUP

GOALS AT THIS TIME. THIS INTERIM REMEDY, INCLUDING THE GROUNDWATER PLANT, WILL CONTINUE TO OPERATE AT LEAST UNTIL THE FINAL ROD HAS BEEN SIGNED.

#### B. DESCRIPTION OF REMEDIAL COMPONENTS

EPA'S SELECTED INTERIM ALTERNATIVE (RA-2) TO REMEDIATE CONTAMINATED GROUNDWATER CONSISTS OF GROUNDWATER EXTRACTION WELLS AT THE NORTHERN BORDER OF THE SITE; TREATMENT OF THE COLLECTED GROUNDWATER; AND DISCHARGE OF THE TREATED EFFLUENT TO THE SUDBURY RIVER. THE ALTERNATIVE MAY ALSO EMPLOY A COLLECTION TRENCH AT THE NORTHERN BORDER OF THE CAP NOW UNDER CONSTRUCTION ON MEGUNKO HILL, DEPENDING ON WHETHER FURTHER STUDY INDICATES THAT SUCH A TRENCH IS FEASIBLE AND NECESSARY. FIGURE 10-1 SHOWS THE APPROXIMATE LOCATION OF THE PROPOSED EXTRACTION WELLS AND/OR TRENCHES. IT IS ANTICIPATED CURRENTLY THAT THE DISCHARGE WILL BE MADE ON-SITE, ALTHOUGH THE COST ESTIMATE FOR RA-2 INCLUDES THE INSTALLATION OF A PIPE TO THE RIVER IF IT IS FOUND TO BE NECESSARY DURING DESIGN. THE SELECTED ALTERNATIVE WILL OPERATE FOR A PERIOD OF FIVE YEARS, DURING WHICH TIME ENVIRONMENTAL MONITORING WILL BE PERFORMED. AFTER THIS TIME PERIOD, EPA WILL EVALUATE THE PERFORMANCE OF THE EXTRACTION AND TREATMENT SYSTEMS IN A FINAL RI/FS AND MAKE A FINAL REMEDY SELECTION IN A SUBSEQUENT FINAL ROD FOR THIS OPERABLE UNIT. THE SYSTEM WILL CONTINUE TO OPERATE AT LEAST UNTIL THE FINAL ROD HAS BEEN SIGNED.

THE SELECTED REMEDY WILL REDUCE CONTAMINANT MIGRATION IN THE DIRECTION OF GROUNDWATER FLOW (INCLUDING INTO THE SUDBURY RIVER) BY CLEANING UP THE MOST HIGHLY CONTAMINATED AREA AND SOURCES OF THE CONTAMINATION. THIS SELECTED REMEDIAL ALTERNATIVE WILL NOT REMEDIATE GROUNDWATER CONTAMINATION IN THE EASTERN PART OF THE PLUME IN DOWNTOWN ASHLAND DURING THE INTERIM REMEDIAL PERIOD. BY EXTRACTING GROUNDWATER NEAR THE NORTHERN BOUNDARY OF THE SITE, HOWEVER, THE SELECTED ALTERNATIVE WILL PREVENT CONTAMINANT CONCENTRATIONS WITHIN THE EASTERN PORTION OF THE PLUME FROM INCREASING, THEREBY PREVENTING CURRENT POTENTIAL RISKS FROM INCREASING IN THIS AREA.

THE SELECTED REMEDY ALSO INCLUDES THE FOLLOWING ELEMENTS: 1) USING INSTITUTIONAL AND ACCESS CONTROLS TO LIMIT EXPOSURE TO CONTAMINANTS. INSTITUTIONAL CONTROLS IN THE FORM OF DEED AND WELL PERMIT RESTRICTIONS WHICH MAY REQUIRE COOPERATION FROM LOCAL AND STATE AUTHORITIES ARE EXAMPLES OF INSTITUTIONAL CONTROLS WHICH COULD BE IMPLEMENTED. THE DEED RESTRICTIONS COULD BE USED TO DETAIL RESTRICTIONS AND SAFEGUARDS ON FUTURE EXCAVATION ACTIVITIES ON THE SITE. THE WELL PERMIT RESTRICTIONS COULD BE IMPOSED BY THE TOWN OF ASHLAND TO RESTRICT THE ABILITY OF LAND-OWNERS TO INSTALL NEW WELLS IN THE AREA OF KNOWN GROUNDWATER CONTAMINATION; 2) FURTHER TESTING IN THE EASTERN PORTION OF THE PLUME TO HELP DETERMINE THE FEASIBILITY OF CLEANING UP GROUNDWATER IN THIS AREA IN THE FUTURE; 3) INSTALLING ADDITIONAL DEEP BEDROCK WELLS TO MORE FULLY DEFINE THE DEPTHS AND LOCATIONS TO WHICH CONTAMINANTS MAY HAVE MIGRATED; 4) CONTINUING MONITORING OF EXISTING RESIDENTIAL AND MONITORING WELLS AND LIMITED SURFACE WATER TESTING TO TRACK ANY FURTHER PROGRESS OF THE PLUME; 5) INSPECTING THE MEGUNKO ROAD WATERLINE TO DETERMINE WHETHER ANY DETERIORATION HAS BEEN CAUSED BY SITE CONTAMINATION; AND 6) PRE-DESIGN STUDIES TO AID IN THE DESIGN OF THE SELECTED INTERIM REMEDY.

THE CONSTRUCTION OF THE GROUNDWATER TREATMENT FACILITY WILL REQUIRE APPROXIMATELY ONE ACRE OF LAND, A SYSTEM OF COLLECTION WELLS AND/OR TRENCHES TO COLLECT THE CONTAMINATED GROUNDWATER, AND A PIPING NETWORK TO TRANSPORT GROUNDWATER TO THE TREATMENT FACILITY. THIS ALTERNATIVE WOULD REQUIRE LESS DISRUPTION TO THE NEARBY RESIDENTIAL COMMUNITY THAN THE OTHER ALTERNATIVES CONSIDERED SINCE THE COLLECTION SYSTEM WOULD BE LOCATED MAINLY ON INDUSTRIALLY ZONED LAND.

THE SYSTEM WILL BE DESIGNED TO BE FLEXIBLE IN ORDER TO ACCOMMODATE POTENTIAL CHANGES IN OPERATION. THIS WILL ALLOW FOR SUCH OPERATING TECHNIQUES AS PULSED PUMPING, OR EXTRACTION WELL RELOCATION BASED ON OPERATING EXPERIENCE. IN ADDITION, THE TREATMENT SYSTEM WILL BE DESIGNED SO THAT IT MAY BE EXPANDED IF A SUBSEQUENT DECISION TO ENLARGE THE COLLECTION SYSTEM IS MADE.

FOR THE PURPOSE OF ESTIMATING THE COST OF THE VARIOUS REMEDIAL ALTERNATIVES THE FS ANALYZED, AS A REPRESENTATIVE TECHNOLOGY, A GROUNDWATER TREATMENT PLANT CONSISTING OF PRECIPITATION, AIR STRIPPING, AND CARBON ADSORPTION TREATMENT. EPA, IN CONSULTATION WITH THE COMMONWEALTH OF MASSACHUSETTS, WILL SELECT THE ACTUAL TECHNOLOGY TO BE USED IN THE INTERIM REMEDY FROM AMONG THE FOLLOWING TECHNOLOGIES: THE AIR STRIPPING TECHNOLOGY OUTLINED BELOW, OR ULTRAVIOLET-OXIDATION OR BIOLOGICAL TREATMENT UNITS IN THE PLACE OF THE AIR-STRIPPING PROCESS AS PART OF A COMPREHENSIVE TREATMENT SYSTEM. A PREDESIGN COST EFFECTIVENESS EVALUATION OF THE THREE TECHNOLOGIES WILL BE CONDUCTED IN ORDER TO SELECT THE TWO TECHNOLOGIES FOR PILOT TESTING. THE FINAL SELECTION OF A



GROUNDWATER TREATMENT TECHNOLOGY WILL BE BASED ON DATA COLLECTED DURING THE PREDESIGN PILOT STUDIES.

FIGURE 10-2 ILLUSTRATES HOW THE AIR STRIPPING TREATMENT PROCESS COULD REMOVE CONTAMINANTS FROM THE AQUIFER AND TREAT THE COLLECTED WATER TO LEVELS THAT ARE SAFE FOR DISCHARGE. GROUNDWATER EXTRACTED FROM THE AQUIFER WOULD UNDERGO PRECIPITATION, A CHEMICAL TREATMENT METHOD THAT CONVERTS DISSOLVED METALS TO AN INSOLUBLE FORM AND ALLOWS SUSPENDED SOLIDS TO ACCUMULATE AND SETTLE. AFTER PRECIPITATION, WATER WOULD PASS THROUGH A SAND OR CARTRIDGE FILTER TO REMOVE SUSPENDED SOLIDS AND WOULD THEN ENTER AN AIR STRIPPER UNIT. AIR STRIPPING IS AN AERATION PROCESS THAT REDUCES CONCENTRATIONS OF VOCs AND SOME SVOCs BY CHANGING CONTAMINANTS IN THE GROUNDWATER INTO A GASEOUS FORM. A FINAL TREATMENT PROCESS, CARBON ADSORPTION, WOULD REMOVE ANY REMAINING ORGANICS IN THE WATER TO LEVELS ACCEPTABLE BY FEDERAL AND STATE REQUIREMENTS FOR DISCHARGE TO THE SUDBURY RIVER. CARBON ADSORPTION REMOVES ORGANIC COMPOUNDS BY FILTERING AND ADSORBING DISSOLVED AND SUSPENDED CONTAMINANTS IN THE TREATED GROUNDWATER. AIR EMISSIONS WOULD ALSO BE CONTROLLED THROUGH THE USE OF CARBON ADSORPTION.

ESTIMATED TIME FOR DESIGN AND CONSTRUCTION:	3 YEARS
ESTIMATED TIME OF OPERATION:	5 YEARS
ESTIMATED CAPITAL COST:	\$5,260,000
ESTIMATED OPERATION AND MAINTENANCE COST (5 YEARS, PRESENT WORTH):	\$2,180,000
ESTIMATED TOTAL COST (PRESENT WORTH):	\$7,440,000

TO THE EXTENT REQUIRED BY LAW, EPA WILL REVIEW THE SITE AT LEAST ONCE EVERY FIVE YEARS AFTER THE INITIATION OF REMEDIAL ACTION AT THE SITE AS LONG AS ANY HAZARDOUS SUBSTANCES, POLLUTANTS OR CONTAMINANTS REMAIN AT THE SITE TO ASSURE THAT THE REMEDIAL ACTION CONTINUES TO PROTECT HUMAN HEALTH AND THE ENVIRONMENT. EPA WILL ALSO EVALUATE RISK POSED BY THE SITE AT THE COMPLETION OF THE REMEDIAL ACTION (I.E., BEFORE THE SITE IS PROPOSED FOR DELETION FROM THE NPL).

#SD

## **XI. STATUTORY DETERMINATIONS**

THE REMEDIAL ACTION SELECTED FOR IMPLEMENTATION AT THE NYANZA CHEMICAL WASTE DUMP SITE IS CONSISTENT WITH CERCLA AND, TO THE EXTENT PRACTICABLE, THE NCP. THE SELECTED REMEDY IS PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT DURING THE INTERIM OPERATIONAL PERIOD, ATTAINS ARARS WHICH APPLY TO THIS LIMITED SCOPE ACTION, AND IS COST EFFECTIVE. THE SELECTED REMEDY, WHICH IS NOT DESIGNED OR EXPECTED TO BE FINAL, ALSO SATISFIES THE STATUTORY PREFERENCE FOR TREATMENT WHICH PERMANENTLY AND SIGNIFICANTLY REDUCES THE MOBILITY, TOXICITY OR VOLUME OF HAZARDOUS SUBSTANCES AS A PRINCIPAL ELEMENT. THE SELECTED REMEDY REPRESENTS THE BEST BALANCE OF TRADEOFFS AMONG ALTERNATIVES WITH RESPECT TO THE PERTINENT CRITERIA IN LIGHT OF THE LIMITED SCOPE OF THIS ACTION. ADDITIONALLY, THE SELECTED REMEDY UTILIZES ALTERNATE TREATMENT TECHNOLOGIES OR RESOURCE RECOVERY TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE.

### A. THE ELECTED REMEDY IS PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT

THE SELECTED REMEDY, VIEWED AS A FIVE-YEAR INTERIM MEASURE, WOULD REDUCE THE OVERALL RISK TO HUMAN HEALTH AND THE ENVIRONMENT. OVER A FIVE-YEAR PERIOD, THE REMEDY WOULD LIMIT THE MIGRATION OF HIGHLY CONTAMINATED GROUNDWATER FROM THE SITE TO AREAS TO THE NORTH AND EAST, THEREBY PREVENTING AN INCREASE IN CURRENT POTENTIAL RISKS IN THE PORTION OF THE PLUME TO THE NORTH AND EAST OF THE SITE. IT WOULD ALSO PREVENT DISCHARGE OF CONTAMINATED GROUNDWATER TO THE SUDBURY RIVER TO SOME EXTENT. THE SELECTED REMEDY WOULD REMOVE A SIGNIFICANT AMOUNT OF CONTAMINANTS, SINCE IT DEALS DIRECTLY WITH THE AREAS WHERE THE HIGHEST CONCENTRATIONS OF GROUNDWATER CONTAMINANTS HAVE BEEN FOUND AND WILL DRAW CONTAMINANTS FROM A LARGE PERCENTAGE OF THE KNOWN PLUME AREA.

FINALLY, IMPLEMENTATION OF THE SELECTED REMEDY WILL NOT POSE UNACCEPTABLE SHORT-TERM RISKS OR CROSS-MEDIA IMPACTS BECAUSE CONTROLS WILL BE PLACED ON POSSIBLE EMISSIONS FROM THE TREATMENT FACILITY TO BE CONSTRUCTED, MOST OF THE REMEDY WILL BE CONSTRUCTED IN A NON-RESIDENTIAL AREA, AND CONSTRUCTION CONTROLS WILL LIMIT ANY FUGITIVE EMISSIONS.

### B. THE SELECTED REMEDY ATTAINS ARARS

THIS REMEDY WILL ATTAIN ALL APPLICABLE OR RELEVANT AND APPROPRIATE FEDERAL AND STATE REQUIREMENTS THAT APPLY TO THIS LIMITED SCOPE INTERIM ACTION. GENERALLY, ARARS FOR THE SELECTED INTERIM REMEDIAL ACTION ARE A SUBSET OF THOSE FOUND IN TABLES 3-1, 3-2, AND 3-4 OF THE FEASIBILITY STUDY. BECAUSE THE FEASIBILITY STUDY CONSIDERED PERMANENT REMEDIAL ALTERNATIVES AND THE REMEDY SELECTED IS A INTERIM REMEDY, SOME OF THE ARARS OUTLINED IN THE FS DO NOT APPLY TO THIS LIMITED INTERIM ACTION. THE ARARS THAT DO APPLY TO THIS INTERIM ACTION ARE LISTED IN TABLES 11-1, 11-2, AND 11-3 AND ARE DISCUSSED BELOW.

WHEN CONSIDERING INTERIM REMEDIES, IT IS APPROPRIATE TO ANALYZE COMPLIANCE ONLY WITH THOSE LAWS AND REGULATIONS THAT ARE APPLICABLE OR RELEVANT AND APPROPRIATE TO THE LIMITED SCOPE OF THE INTERIM ACTION. FOR INSTANCE, FOR GROUNDWATER THAT IS EXTRACTED AND TREATED, THE SELECTED REMEDY WOULD MEET ARARS FOR THE DISCHARGE OF THE TREATED GROUNDWATER INTO THE SUDBURY RIVER, THE DISCHARGE OF AIR, AND THE DISPOSAL OF SLUDGES RESULTING FROM THE TREATMENT PROCESS.

#### **1. CHEMICAL-SPECIFIC ARARS**

CHEMICAL-SPECIFIC ARARS ARE IDENTIFIED IN TABLE 11-1. IN THE FOLLOWING DISCUSSION, THESE ARARS ARE DESCRIBED BY AFFECTED MEDIA REQUIRING REMEDIATION AND MEDIA THAT MAY RECEIVE DISCHARGES AS A RESULT OF REMEDIAL ACTION (I.E., AIR).

**SURFACE WATER:** MASSACHUSETTS HAS INCORPORATED FEDERAL AMBIENT WATER QUALITY CRITERIA (CLEAN WATER ACT - SECTION 304) AS STATE STANDARDS (314 CMR 4.00) FOR SEVERAL OF THE CONTAMINANTS OF CONCERN (SEE TABLE 11-1). THESE STATE STANDARDS ARE APPLICABLE AS CHEMICAL-SPECIFIC REQUIREMENTS IN DETERMINING EFFLUENT DISCHARGE LIMITS, ALTHOUGH THE DISCHARGE WILL BE OCCURRING FROM AN ON-SITE TREATMENT FACILITY, MOST LIKELY TO AN ON-SITE RECEIVING WATER. THE CRITERIA WILL BE MET BY SETTING EFFLUENT DISCHARGE LIMITS, DESIGNING AND CONSTRUCTING A TREATMENT PLANT TO MEET THOSE

LEVELS, AND BY MONITORING THE EFFLUENT AND RECEIVING WATERS TO ASSURE COMPLIANCE WITH THE CRITERIA.

AIR: FEDERAL PRIMARY AND SECONDARY NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS) DO NOT EXIST FOR VOLATILE EMISSIONS OF THE COMPOUNDS PRESENT AT THE NYANZA SITE AND DOWNGRADE AREA. THUS, THERE IS NO NAAQS APPLICABLE OR RELEVANT AND APPROPRIATE TO VOLATILE EMISSIONS. SUCH EMISSIONS COULD POTENTIALLY EMANATE FROM THE TREATMENT FACILITY, IF THE AIR STRIPPING TECHNOLOGY IS SELECTED FOLLOWING PILOT STUDIES. FEDERAL AIR QUALITY STANDARDS FOR PARTICULATE MATTER DO EXIST AND WILL BE USED IN ASSESSING EXCAVATION AND TREATMENT EMISSION CONTROLS. THESE STANDARDS ARE RELEVANT AND APPROPRIATE, RATHER THAN APPLICABLE, SINCE THEY WERE ORIGINALLY DEVELOPED TO CONTROL STACK AND AUTOMOBILE EMISSIONS. THRESHOLD LIMIT VALUES (TLVS) ESTABLISHED BY OSHA REGULATIONS PROVIDE AN EXTENSIVE LIST OF CONTROL LEVELS WHICH ARE APPLICABLE TO ON-SITE REMEDIATION ACTIVITIES SUCH AS CONSTRUCTION OF THE EXTRACTION WELLS AND COLLECTION NETWORK. MASSACHUSETTS AIR POLLUTION CONTROL REGULATIONS (310 CMR SECTION 6.00-8.00) ARE APPLICABLE TO THE EVALUATION OF AIR EMISSIONS ASSOCIATED WITH REMEDIAL ACTIONS AT THE SITE (E.G., GROUNDWATER TREATMENT SYSTEMS). ALSO, MASSACHUSETTS GUIDANCE ON ACCEPTABLE AMBIENT AIR LEVELS (AALS) AND THRESHOLD EFFECTS EXPOSURE LIMITS (TELS) WILL BE CONSIDERED RATHER THAN BEING DEEMED RELEVANT AND APPROPRIATE SINCE THEY ARE NOT PROMULGATED CRITERIA.

AIR RELATED ARARS WILL BE MET THROUGH THE USE OF ENGINEERING CONTROLS AND MONITORING DURING DESIGN AND CONSTRUCTION OF THE REMEDY, AND BY THE POSSIBLE UTILIZATION OF EMISSIONS CONTROLS DURING OPERATION OF THE TREATMENT FACILITY.

## 2. LOCATION-SPECIFIC ARARS

POTENTIAL LOCATION-SPECIFIC ARARS FOR THE NYANZA SITE AND ITS ENVIRONS ARE IDENTIFIED IN TABLE 11-2.

WETLANDS/FLOODPLAINS: SEVERAL FEDERAL AND STATE LAWS AND REGULATIONS REGULATE ACTIVITIES IN WETLANDS AND FLOODPLAINS. UNDER FEDERAL LAW, THE CLEAN WATER ACT (SECTION 404) REGULATES ACTIVITY IN THE VICINITY OF WETLANDS. THE CWA REQUIRES THAT THE EFFECTS ON WETLANDS BE EVALUATED AND NO ACTIVITY THAT ADVERSELY AFFECTS A WETLAND BE PERMITTED IF A PARTICULAR ALTERNATIVE HAVING LESS EFFECT IS AVAILABLE. THIS REQUIREMENT IS APPLICABLE AND WILL BE MET BY AVOIDANCE OF ACTIVITIES IN THE VICINITY OF WETLANDS. EPA'S REGULATIONS CONTAINED IN 40 CFR PART 6, APPENDIX A DESCRIBES EPA'S POLICY ON IMPLEMENTING EXECUTIVE ORDER 11990 (WETLANDS PROTECTION). THE PROCEDURES SUBSTANTIATIVELY REQUIRE THAT EPA CONDUCT ITS ACTIVITIES TO AVOID TO THE EXTENT POSSIBLE, THE LONG AND SHORT-TERM ADVERSE IMPACTS ASSOCIATED WITH THE DESTRUCTION OF OR MODIFICATION OF WETLANDS. THE PROCEDURES ALSO REQUIRE EPA TO AVOID OR INDIRECT SUPPORT OF NEW CONSTRUCTION IN WETLANDS WHEREVER THERE ARE PRACTICABLE ALTERNATIVES AND TO MINIMIZE POTENTIAL HARM TO WETLANDS WHEN THERE ARE NO PRACTICABLE ALTERNATIVES. THE SELECTED ALTERNATIVE IS NOT LIKELY TO HAVE ANY SIGNIFICANT IMPACT ON WETLANDS. ALTHOUGH THERE ARE WETLANDS LOCATED ON THE SITE, REMEDIAL ACTIVITIES WILL NOT BE CARRIED OUT IN THE WETLANDS. IN ADDITION, THE REMEDIAL ACTIVITIES IN THE SELECTED REMEDY WILL NOT TAKE PLACE IN A FLOODPLAIN, AND THUS THE REQUIREMENTS RELATING TO FLOODPLAINS ARE NOT APPLICABLE.

THE MASSACHUSETTS DEP WETLANDS PROTECTION LAWS (310 CMR 10.00) ARE APPLICABLE TO ALL REMEDIAL ALTERNATIVES INVOLVING WORK IN OR WITHIN 100 FEET OF A WETLAND. SPECIFIC REQUIREMENTS AND RESTRICTIONS OF THESE ARARS ARE PRESENTED IN TABLE 11-2. IT IS NOT ANTICIPATED AT THIS TIME THAT ACTIVITIES WITHIN 100 FEET OF A WETLAND WILL BE REQUIRED. IF DURING THE DESIGN PHASE IT APPEARS THAT THE REMEDIAL ALTERNATIVE WILL AFFECT WETLANDS, THE REQUIREMENTS DESCRIBED IN TABLE 11-2 WILL BE COMPLIED WITH.

## 3. ACTION-SPECIFIC ARARS

ACTION SPECIFIC ARARS FOR THE SELECTED REMEDY ARE PRESENTED IN TABLE 11-3. MAJOR REQUIREMENTS THAT MUST BE ATTAINED ARE DISCUSSED IN THE FOLLOWING BRIEF DESCRIPTIONS.

WATER REGULATIONS: SEVERAL REGULATIONS PROMULGATED UNDER THE CLEAN WATER ACT (CWA) ARE APPLICABLE TO REMEDIAL ACTIVITIES THAT INVOLVE GROUNDWATER TREATMENT, AND DISCHARGES TO SURFACE WATER. ALTHOUGH ON-SITE CERCLA ACTIONS DO NOT REQUIRE PERMITS, THE SUBSTANTIVE NPDES PERMIT REQUIREMENTS FOR POINT-SOURCE DISCHARGES ARE APPLICABLE. THESE REGULATIONS INCLUDE, BUT ARE NOT

LIMITED TO, REQUIREMENTS FOR COMPLIANCE WITH WATER QUALITY STANDARDS, A DISCHARGE MONITORING SYSTEM, RECORDS MAINTENANCE, DEVELOPMENT OF AND ADHERENCE TO AN NPDES BEST MANAGEMENT PRACTICE PROGRAM, AND CONSTRUCTION AND OPERATION OF A TREATMENT SYSTEM WHICH MEETS THE TECHNOLOGICAL REQUIREMENTS OF THE CWA. TOXIC POLLUTANT STANDARDS (40 CFR SECTION 129), SPECIAL REQUIREMENTS UNDER NPDES FOR SEVERAL POLLUTANTS INCLUDING BENZIDINE, ARE RELEVANT AND APPROPRIATE BECAUSE THE ON-SITE DISCHARGE IS SUBJECT ONLY TO THE SUBSTANTIATIVE REQUIREMENTS OF THE PERMITTING PROGRAM. TABLE 11-4 DETAILS THE EXPECTED INFLUENT CONCENTRATIONS AND CALCULATED DISCHARGE STANDARDS TO MEET THE WATER QUALITY CRITERIA IN THE MASSACHUSETTS SURFACE WATER QUALITY STANDARDS BASED ON THE FS ASSUMPTIONS OF THE DISCHARGE LOCATION AND DILUTION RATES. CASE-BY CASE TECHNOLOGICALLY BASED DISCHARGE LIMITATIONS WILL BE ESTABLISHED DURING DESIGN BASED IN PART ON PRE-DESIGN STUDIES OF THE TREATMENT SYSTEMS DESCRIBED IN SECTION X.

SUBSTANTIVE REQUIREMENTS OF THE MASSACHUSETTS SURFACE WATER DISCHARGE PERMIT PROGRAM WILL BE APPLICABLE TO ON-SITE SURFACE DISCHARGES. NUMERICAL STANDARDS THAT MASSACHUSETTS HAS ADOPTED (UNDER 314 CMR 4.00) FROM THE FEDERAL AQUATIC WATER QUALITY CRITERIA FOR SEVERAL CONTAMINANTS OF CONCERN WILL BE APPLICABLE IN DETERMINING EFFLUENT DISCHARGE LIMITS TO THE RECEIVING WATER.

MASSACHUSETTS ALSO HAS A WITHDRAWAL PERMIT REQUIREMENT FOR REGISTRATION OF GROUNDWATER OR SURFACE WATER WITHDRAWALS GREATER THAN 100,000 GALLONS PER DAY (MASSACHUSETTS WATER RESOURCES MANAGEMENT PROGRAM). THE CURRENT ESTIMATED WITHDRAWAL OF 70,000 GALLONS PER DAY FOR THE SELECTED REMEDY WILL NOT TRIGGER THE SUBSTANTIATIVE REQUIREMENTS OF THIS PROGRAM, BUT THIS ESTIMATE IS SUBJECT TO CHANGE PENDING PRE-DESIGN WORK. IF THE WITHDRAWAL RATE OF THE SELECTED REMEDY EXCEEDS 100,000 GALLONS PER DAY, 310 CMR 36.00 MAY BE APPLICABLE. A GROUNDWATER HYDRAULIC ANALYSIS WOULD BE REQUIRED WHICH INCLUDES THE FOLLOWING COMPONENTS: THE IDENTIFICATION OF ALL SURFACE WATER RESOURCES WITHIN A 1000 FT. RADIUS; AND A PREDICTION OF THE DRAWDOWN IMPACT OF THE EXTRACTION SYSTEM ON ALL IDENTIFIED USERS AND RESOURCES.

CLEAN AIR REGULATIONS: RELEVANT AND APPROPRIATE REQUIREMENTS FOR ACTIVITIES THAT INVOLVE EXCAVATION (INCLUDING WELL INSTALLATION, COLLECTION SYSTEM INSTALLATION, AND TREATMENT PLANT CONSTRUCTION) AND AIR EMISSIONS FROM OPERATING TREATMENT FACILITIES INCLUDE THE NATIONAL AIR QUALITY STANDARDS FOR TOTAL SUSPENDED PARTICULATES UNDER THE CLEAN AIR ACT (CAA). THE SPECIFIC STANDARDS ARE PRESENTED IN TABLE 11-3. IF A REMEDIAL ALTERNATIVE INVOLVES AIR STRIPPING OR OTHER AIR EMISSION FROM A STATIONARY SOURCE, THE MASSACHUSETTS AIR POLLUTION CONTROL REGULATIONS ARE ALSO APPLICABLE. THE SPECIFIC REQUIREMENTS ARE PRESENTED IN TABLE 11-3.

PROPOSED STANDARDS FOR CONTROL OF EMISSIONS OF VOLATILE ORGANICS - 52 FR 3748 (FEBRUARY 5, 1987) PRESCRIBES PROPOSED STANDARDS FOR THE EMISSIONS OF VOLATILE ORGANICS FROM UNITS SUCH AS AIR STRIPPERS. SINCE THESE STANDARDS ARE PROPOSED, THIS REGULATION IS NEITHER APPLICABLE NOR RELEVANT AND APPROPRIATE, BUT IS TO BE CONSIDERED IF THE AIR STRIPPER EVENTUALLY IS SELECTED AS THE APPROPRIATE TECHNOLOGY AFTER PILOT TESTING. AIR EMISSIONS FROM A POTENTIAL AIR STRIPPER ARE TO BE CONTROLLED IN ACCORDANCE WITH OSWER DIRECTIVE 9355.0-28, JUNE 15, 1989. THIS DIRECTIVE CALLS FOR THE ADDITION OF CONTROLS SHOULD CERTAIN VOC EMISSION RATES BE EXCEEDED. SINCE VOC EMISSIONS CONTRIBUTE TO OZONE PRODUCTION AND THE SITE IS LOCATED IN AN OZONE NON-ATTAINMENT AREA, THE REGION HAS DETERMINED IT IS NECESSARY TO CONTROL VOC EMISSIONS FROM THE AIR STRIPPING UNIT (IF IMPLEMENTED) REGARDLESS OF THE VOC EMISSION RATE, IN ACCORDANCE WITH REGIONAL POLICY. TREATMENT OF THE AIR STREAM BY CARBON ADSORPTION WILL PREVENT BOTH EXPOSURE THROUGH INHALATION AND WILL PREVENT THE PRODUCTION OF OZONE RESULTING FROM EMISSIONS OF ADDITIONAL VOCs TO THE AIR.

HAZARDOUS WASTE REGULATIONS: THE MASSACHUSETTS DIVISION OF WATER POLLUTION CONTROL CONTAINING SUPPLEMENTAL REQUIREMENTS FOR HAZARDOUS WASTE MANAGEMENT FACILITIES ARE RELEVANT AND APPROPRIATE FOR THE SELECTED REMEDY, 314 CMR 8.00. THE TREATMENT FACILITY PLANNED IS A "WASTEWATER TREATMENT UNIT" AS DEFINED IN 314 CMR 8.02. THE FACILITY SHALL COMPLY WITH:

- A. THE MANAGEMENT STANDARDS OF 310 CMR 30.500, INCLUDING: GENERAL WASTE ANALYSIS; SECURITY; GENERAL INSPECTION; PERSONNEL TRAINING; CONTINGENCY PLAN; EMERGENCY PROCEDURES, PREPAREDNESS AND PREVENTION; RECORD KEEPING AND REPORTING; GENERAL REQUIREMENTS FOR IGNITABLE, REACTIVE, OR INCOMPATIBLE WASTES; CLOSURE; AND, WHERE APPLICABLE, POST-CLOSURE.
- B. THE TECHNICAL STANDARDS OF 310 CMR 30.600, INCLUDING GENERAL REQUIREMENTS FOR ALL FACILITIES.

THE FS IDENTIFIED RCRA REGULATIONS SET OUT IN 40 CFR PART 264 AS AN ARAR APPLICABLE TO THE SELECTED REMEDIAL ALTERNATIVE. HOWEVER, AFTER FURTHER CONSIDERATION, EPA HAS DETERMINED THAT PART 264 IS NOT AN ARAR. THIS IS BECAUSE 40 CFR PART 264.1(G)(6) PROVIDES THAT THE REQUIREMENTS OF PART 264 DO NOT APPLY TO THE "OWNER OR OPERATOR OF...A WASTEWATER TREATMENT UNIT AS DEFINED IN PART 260.10..." THE TREATMENT FACILITY PLANNED FOR THIS REMEDIAL ACTION IS A "WASTEWATER TREATMENT UNIT" AS DEFINED IN PART 260.10.

ALTHOUGH RCRA SUBTITLE C LAND DISPOSAL RESTRICTIONS (LDRS) WERE IDENTIFIED IN THE FS AS AN ARAR APPLICABLE TO THE DISPOSAL OF TREATMENT RESIDUALS, BECAUSE THERE WILL BE NO DISPOSAL OF RCRA WASTE OCCURRING ON-SITE, RCRA DISPOSAL REQUIREMENTS ARE NOT AN ARAR. ARARS ADDRESS MATERIAL THAT IS LEFT ON-SITE. MATERIAL THAT IS SHIPPED OFF-SITE IS SUBJECT TO RCRA DISPOSAL REQUIREMENTS, BUT THOSE REQUIREMENTS ARE NOT ARARS. IF THE RESIDUALS FROM THE TREATMENT UNIT ARE DETERMINED TO BE A RCRA WASTE, OFF-SITE DISPOSAL OF THE RESIDUAL WILL BE IN COMPLIANCE WITH LDR REQUIREMENTS.

MASSACHUSETTS HAS RELEVANT AND APPROPRIATE HAZARDOUS WASTE REGULATIONS AT 314 CMR 30.00, PROVIDING A COMPREHENSIVE PROGRAM FOR THE HANDLING, STORAGE, GENERATION, TRANSPORTATION, TREATMENT, USE, RE-USE, AND RECYCLING OF HAZARDOUS WASTE AND RECORD KEEPING REQUIREMENTS FOR THE MENTIONED ACTIVITIES.

OTHER ACTION-SPECIFIC REGULATIONS: OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA): FEDERAL OSHA REQUIREMENTS THAT REGULATE WORKER SAFETY AND EMPLOYEE RECORDS MUST BE FOLLOWED DURING ALL SITE WORK. THESE REGULATIONS INCLUDE SAFETY AND HEALTH STANDARDS FOR FEDERAL SERVICE CONTRACTS AND RECORD KEEPING, REPORTING AND RELATED REGULATIONS. SINCE THESE REGULATIONS GOVERN GENERAL WORKING CONDITIONS WITHIN INDUSTRY AND PROVIDE MINIMUM PROTECTION STANDARDS FOR WORKERS INVOLVED IN REMEDIAL ACTIONS, THESE REGULATIONS ARE APPLICABLE.

THE FS IDENTIFIED DEPARTMENT OF TRANSPORTATION (DOT) RULES FOR TRANSPORTATION OF HAZARDOUS MATERIALS AND STANDARDS APPLICABLE TO THE TRANSPORTERS OF HAZARDOUS WASTE-RCRA SECTION 3003, 40 CFR SECTIONS 262 AND 263, 40 CFR 170 AND 179 AS ARARS APPLICABLE TO THE TRANSPORTATION OF HAZARDOUS MATERIALS OFF-SITE. AS EXPLAINED ABOVE IN CONNECTION WITH RCRA LDR REQUIREMENTS, BECAUSE THESE REQUIREMENTS DO NOT ADDRESS THE HANDLING OF HAZARDOUS WASTE ON-SITE, THEY ARE NOT ARARS. OF COURSE, THESE REQUIREMENTS WILL BE MET WHEN WASTE IS TRANSPORTED OFF-SITE.

MASSACHUSETTS HAS HAZARDOUS SUBSTANCE "RIGHT TO KNOW" REGULATIONS ESTABLISHING REQUIREMENTS TO PROTECT HEALTH AND SAFETY OF EMPLOYEES AND COMMUNITY RESIDENTS THROUGH THE COMMUNICATION OF INFORMATION REGARDING TOXIC AND HAZARDOUS SUBSTANCES. THESE REGULATIONS ARE APPLICABLE TO ON-SITE WORKERS INVOLVED IN THE REMEDIAL ACTION.

#### C. THE SELECTED REMEDIAL ACTION IS COST-EFFECTIVE

IN THE AGENCY'S JUDGMENT, THE SELECTED REMEDY IS COST EFFECTIVE, I.E., REMEDY AFFORDS OVERALL EFFECTIVENESS PROPORTIONAL TO ITS COSTS. IN SELECTING THIS REMEDY, ONCE EPA IDENTIFIED ALTERNATIVES THAT ARE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT AND THAT ATTAIN, OR, AS APPROPRIATE, WAIVE SUCH ARARS AS ARE RELEVANT TO THIS INTERIM ACTION, EPA EVALUATED THE OVERALL EFFECTIVENESS OF EACH ALTERNATIVE BY ASSESSING THE RELEVANT TWO CRITERIA -- REDUCTION IN TOXICITY, MOBILITY, AND VOLUME THROUGH TREATMENT; AND SHORT TERM EFFECTIVENESS, IN COMBINATION. LONG TERM EFFECTIVENESS AND PERMANENCE IS NOT RELEVANT TO THIS INTERIM REMEDY AND IS THEREFORE NOT BEING CONSIDERED. THE RELATIONSHIP OF THE OVERALL EFFECTIVENESS OF THIS REMEDIAL ALTERNATIVE WAS DETERMINED TO BE PROPORTIONAL TO ITS COSTS. THE COSTS OF THIS REMEDIAL ALTERNATIVE ARE:

ESTIMATED CAPITAL COST:	\$5,260,000;
ESTIMATED OPERATION AND MAINTENANCE COST (5 YEARS, PRESENT WORTH):	\$2,180,000
ESTIMATED TOTAL COST (PRESENT WORTH):	\$7,440,000

#### D. THE SELECTED REMEDY UTILIZES PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT OR RESOURCE RECOVERY TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE

ONCE THE AGENCY IDENTIFIED THOSE ALTERNATIVES THAT ATTAIN OR, AS APPROPRIATE, WAIVE ARARS AND THAT ARE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT, EPA IDENTIFIED WHICH ALTERNATIVE UTILIZES PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES OR RESOURCE RECOVERY TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE. THIS DETERMINATION WAS MADE BY DECIDING WHICH ONE OF THE IDENTIFIED ALTERNATIVES PROVIDES THE BEST BALANCE OF TRADE-OFFS AMONG ALTERNATIVES IN TERMS OF: 1) REDUCTION OF TOXICITY, MOBILITY OR VOLUME THROUGH TREATMENT; 2) SHORT-TERM EFFECTIVENESS; 3) IMPLEMENTABILITY; AND 4) COST TO THE EXTENT THAT THESE FACTORS ARE RELEVANT TO AN INTERIM REMEDY. LONG-TERM EFFECTIVENESS AND PERMANENCE WAS NOT CONSIDERED DUE TO THE INTERIM NATURE OF THE SELECTED REMEDY. THE BALANCING TEST EMPHASIZED THE REDUCTION OF TOXICITY, MOBILITY AND VOLUME THROUGH TREATMENT AND CONSIDERED THE PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT, THE BIAS AGAINST OFF-SITE LAND DISPOSAL OF UNTREATED WASTE, AND COMMUNITY AND STATE ACCEPTANCE.

THE SELECTED REMEDY PROVIDES THE BEST BALANCE OF TRADE-OFFS AMONG THE ALTERNATIVES GIVEN THE LIMITED SCOPE OF THE INTERIM ACTION SELECTED. CONSIDERATION OF LONG-TERM EFFECTIVENESS DOES NOT APPLY DUE TO THE SHORT-TERM NATURE OF THE SELECTED REMEDY. THE SELECTED REMEDY WILL ACHIEVE REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT OF THE MOST HIGHLY CONTAMINATED GROUNDWATER IN A TREATMENT FACILITY, THEREBY REDUCING THE MIGRATION OF CONTAMINANTS. THE SELECTED REMEDY IS HIGHLY IMPLEMENTABLE SINCE IT IS TO BE CONSTRUCTED IN A LIMITED AREA THAT IS PRIMARILY INDUSTRIAL IN NATURE AND WILL THEREFORE REQUIRE A MINIMUM AMOUNT OF COORDINATION WITH OTHER GOVERNMENT AGENCIES AND LANDOWNERS. FINALLY THE SELECTED REMEDY WILL ACHIEVE THE GOALS OF THE INTERIM ACTION, THAT IS REDUCING MIGRATION OF CONTAMINANTS AND GATHERING OF FURTHER DATA FOR USE IN SELECTING THE FINAL REMEDY, WHILE COSTING THE LEAST OF THE ACTIVE OPTIONS CONSIDERED AS INTERIM OPTIONS.

- E. THE SELECTED REMEDY SATISFIES THE PREFERENCE FOR TREATMENT WHICH PERMANENTLY AND SIGNIFICANTLY REDUCES THE TOXICITY, MOBILITY OR VOLUME OF THE HAZARDOUS SUBSTANCES AS A PRINCIPAL ELEMENT

THE PRINCIPAL ELEMENT OF THE SELECTED REMEDY IS THE EXTRACTION AND TREATMENT OF GROUNDWATER AT THE NORTHERN BOUNDARY OF THE SITE AND ITS SUBSEQUENT DISCHARGE TO THE SUDBURY RIVER. THIS ELEMENT ADDRESSES THE PRIMARY EXPOSURE PATHWAY AT THE SITE FOR THIS OPERABLE UNIT; CONTAMINATION OF GROUNDWATER IN BOTH THE OVERBURDEN AND BEDROCK AQUIFERS. THE SELECTED REMEDY SATISFIES THE STATUTORY PREFERENCE FOR REDUCTION IN THE TOXICITY, MOBILITY OR VOLUME TO THE EXTENT POSSIBLE IN LIGHT OF ITS LIMITED SCOPE BY EXTRACTING AND TREATING CONTAMINATED GROUNDWATER AT A LOCATION WHERE IT IS MOST CONTAMINATED AND PREVENTING ITS FURTHER MIGRATION TO DOWNGRADIENT AREAS. THIS INTERIM RECORD OF DECISION WILL BE FOLLOWED BY A FINAL ROD WHICH WILL DETERMINE WHAT FURTHER ACTIONS, IF ANY, WILL BE NECESSARY TO MEET THE PREFERENCE FOR TREATMENT WHICH WILL PERMANENTLY AND SIGNIFICANTLY REDUCE TOXICITY, MOBILITY, OR VOLUME OF HAZARDOUS SUBSTANCES.

**#DNSC**

## **XII. DOCUMENTATION OF NO SIGNIFICANT CHANGES**

EPA PRESENTED A PROPOSED PLAN FOR REMEDIATION OF THE SITE IN JUNE 1991. THE MANAGEMENT OF MIGRATION PORTION OF THE SELECTED ALTERNATIVE INCLUDED EXTRACTION OF CONTAMINATED GROUNDWATER, TREATMENT OF THE COLLECTED GROUNDWATER AND DISCHARGE OF THE TREATED EFFLUENT TO THE SUDBURY RIVER. THERE HAVE BEEN NO SIGNIFICANT CHANGES MADE TO THE PLAN AS STATED IN THE PROPOSED PLAN OF JUNE 1991.

**#STR**

## **XIII. STATE ROLE**

THE MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION (DEP) HAS REVIEWED THE VARIOUS ALTERNATIVES AND HAS INDICATED ITS SUPPORT FOR THE SELECTED REMEDY. THE STATE HAS ALSO REVIEWED THE REMEDIAL INVESTIGATION, RISK ASSESSMENT AND FEASIBILITY STUDY TO DETERMINE IF THE SELECTED REMEDY IS IN COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE STATE ENVIRONMENTAL LAWS AND REGULATIONS. THE MASSACHUSETTS DEP CONCURS WITH THE SELECTED REMEDY FOR THE NYANZA CHEMICAL WASTE DUMP SITE. A COPY OF THE DECLARATION OF CONCURRENCE IS ATTACHED AS APPENDIX II.